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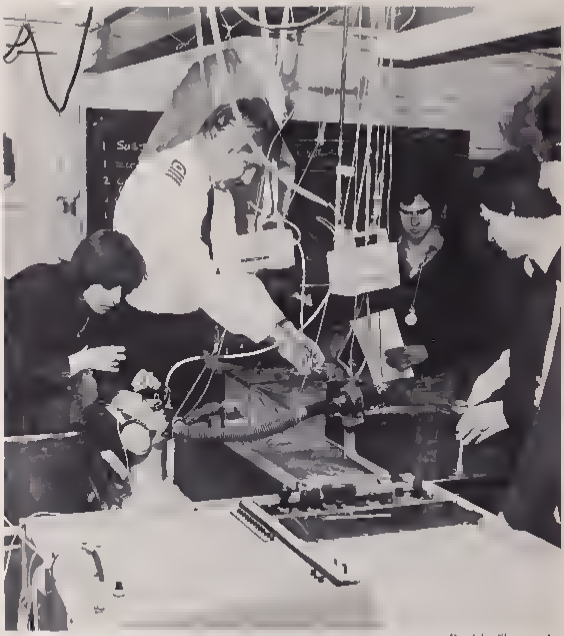

Daedalus Photographic

Subject undergoing static immersion in cold water in the experimental tank at the Institute of Naval Medicine's experimental facilities at Seafield Park. The results of some of these experiments are described in the article on page 26

Editorial

I have enjoyed my task during my brief charge as Editor of this Journal which is important to our Medical Service and worthy of greater support from within it. It is a medium of communication between those still serving, those who have retired and those who are associated with us in our task. My thanks to the Editorial Secretary, the Editorial Committee and all our subscribers — and not least our contributors. I welcome my successor, the new Dean of Naval Medicine and SRA (INM), Surgeon Rear Admiral R J W Lambert, to the task as Editor.

It has been pleasant to enjoy the freedom of these columns to prattle on largely I suspect unheeded about my views of the objectives of the Medical Service and its real needs and real tasks. How many of these objectives can be effected or accepted as practical policy remains to be seen.

In the seventies the Medical Service was subjected to "a period of severe economy pursued with unprecendented administrative persistence which severely limited managerial effectiveness". A direct result is that the Medical Service remains in a fragile state. We now have a Government which believes in individual initiative and responsibility and individual effort and rewards for it and strives to encourage those qualities by its policies. But do we have within the Medical Service the direction, delegation of responsibility and monitoring of effective activity to encourage such an attitude? Certainly the Medical Service does not at present properly control and manage whatever resources are allocated to it from the Defence Vote.

The full value of the contribution the Medical Service can make to personnel effectiveness in peace and war is not yet fully appreciated. Its clinical care and cure and resuscitative services — essential to maintain the Go Go morale of the individual — are now more appreciated but their full value is inhibited by our inefficient deployment of their services. The new dimensions of our contributions to "human factors" in operational medical support could be enhanced. All could be more effective with a few more people particularly medical officers and curiously enough at no great expense in the vast totality of Defence expenditure. To achieve all this we need to recruit and retain professionally competent medical officers motivated to the Navy for our whole Medical Service — and we are one Medical Service despite our many specialised parts and tasks. We do have one purpose — to use our expertise for the benefit of the Navy and to do that properly we need the right people which means real professionally satisfying jobs.

In addition to more people we need good management and I am sure that our most pressing problem — and the most pressing problem for medicine today — is "to reconcile good doctoring with good management". Good management requires not only an appreciation of the real

priorities and tasks but also the flexibility and responsibility to deal with them. Perhaps the climate is right for such action... action effected without a plethora of committees study groups reviews working parties and the endless paper from which we suffer though perhaps less than other medical organisations.

Decisive action today can only be accepted with enthusiasm after consultation and explanation. Such action used to be called leadership and it is not a Bowler Hat [1]. We need it at all levels... and its lack is reflected in the concern voiced by medical officers in the Attitude Survey about poor communications. But communication is a two-way process it needs transmitters and receivers — and selectivity and cognisance of what is important in the messages transmitted [2].

The new decade has started with the raucous cries of the new-born infant. While we develop and deploy our professionalism all must realise that as yet we do not know the nature of any possible future conflict to prepare for which is part of our task. Traditional Britishness may help but medically we need to develop our skills in treating the new dimensions of trauma created by modern missiles and bullets and the new needs of chemical casualties and radiation casualties. Meanwhile our efforts to ensure that our people are healthy physically fit and ergonomically effective in the control of their weaponry must continue.

We can do none of these things adequately without more people particularly medical officers. For years we have neither recruited nor retained the numbers allocated to us for our task. Why?

1 *Leadership is not a Bowler Hat.* P J. Print. David & Charles. 1977.
2 Editorial. *J. Roy. Naval Med. Serv.* 1977 63(3) 115.

T. L. Cleave and the Fibre Story

K W Heaton

History tells us that really original thinkers tend to be scorned or ignored in their own time and when recognition comes it is too late for them to appreciate it Happily this has not been true of Surgeon Captain T L Cleave although his ideas about diet and disease have certainly been revolutionary For thirty years he did experience the neglect and scorn of the medical establishment but in 1979 in his 73rd year he received the accolade of two gold medals in recognition of his immensely fertile contribution to twentieth century medicine

The essence of Cleave s hypothesis is as follows when man refines his carbohydrate foods that is to say separates the carbohydrate from its fibrous matrix he produces a diet which damages his body in a number of ways but especially two Firstly the refined diet allows carbohydrate into the gut and the bloodstream too rapidly and too easily so that amongst other things the eater inadvertently consumes more energy or calories than he needs Secondly a refined diet deprives the lower intestine of the food residues which it needs for its normal function especially motor function and so paves the way for constipation and other large bowel disorders

The beauty of this hypothesis lies in its ability to explain so many facts which are otherwise obscure There is a whole range of diseases which are peculiar to civilised man and which to the best of our knowledge became common in Europe and North America in the early years of the twentieth century as the infective diseases began to be conquered Cleave saw that many of these diseases of civilisation could be explained as the consequences of eating refined carbohydrate pointing out the crucial fact that refined foods are an artefact of technological civilisation

Cleave first expounded his views in 1956 in this journal[1] and developed them in a series of books — on coronary heart disease in 1957[2] on varicose veins in 1960[3] and on peptic ulcer in 1962[4] Then came the grand synthesis of his ideas in two editions (1966 and 1969) of a book called Diabetes Coronary Thrombosis and the Saccharine Disease written jointly with G D Campbell and in its second edition N S Painter[5 6] In this book Cleave made the daring suggestion that all the diseases attributable to refined carbohydrate should be considered as different manifestations of a single master disease the Saccharine Disease The word saccharine (which is pronounced to rhyme with the river Rhine) is used in its original sense of sugar related and is justified on the grounds that all carbohydrates are absorbed into the bloodstream as simple sugars or monosaccharides Cleave s last book entitled simply 'The Saccharine Disease' and published in 1974[7] has been a best seller In my opinion it should be required reading for every medical student Since the

1969 edition Cleave has had the pleasure of seeing his ideas widely discussed At the same time he has had to endure much misunderstanding and stealing of his thunder and there are still relatively few who realise that he is the *eminence grise* behind the current intense interest in dietary fibre Fewer still appreciate his profound but simple philosophy which extends far beyond dietary fibre

Adaptation

The rock on which Cleave built was the Darwinian theory of evolutionary adaptation which is summed up in the phrase survival of the fittest" This means that in the struggle for existence those individuals and species survive which are best adapted to their environment Cleave is a keen natural historian and like Darwin he was deeply impressed by how perfectly wild animals are adapted to their environment An animal s environment includes the food it eats There are many thousands of animal species each with its own diet but in its natural habitat an animal rarely if ever suffers disease caused by its diet For example it does not develop dental caries obesity or constipation yet such disease affects most civilised humans This clearly suggests that civilised man is not adapted to his food Indeed the time scale of evolution is such that he cannot be adapted The technologies of flour milling and sugar refining have only been available for hundreds of years whereas adaptation by natural selection operates over thousands and millions of years

Cannot the proneness of civilised man to disease be explained on the basis that his body was imperfectly made that is on genetic grounds? No says Cleave It is hardly likely that evolution would fail in just one species and that one is most successful product In any case diseases of proven genetic origin that is the hereditary defects are all rare The commonest clubfoot, occurs only once in 238 births In contrast the chances of developing diabetes gallstones or obesity are ten to a hundred times greater The role of genetic make up is to determine which organ or system fails when a person is exposed to refined carbohydrate One person develops appendicitis another simple constipation a third diverticular disease and a fourth coronary heart disease

The crucial facts behind the saccharine disease concept are epidemiological. It was an extraordinary achievement for Cleave to identify so many of the diseases peculiar to civilised man — and that without help and without formal training in epidemiology or statistics Partly by assiduous reading but largely by correspondence, he gathered evidence that many metabolic and gastro intestinal diseases are rare in primitive communities which have not gone over to refined foods. But the really creative step was to conceive mechanisms to link the diseases and the foods

With such a wide ranging conception there were bound to be gaps in the evidence and errors in some of the suggested mechanisms This does not detract from the achievement In every pioneering activity mistakes are made for example in early maps of the world Every original thinker is followed by scores of modifiers and developers The important thing was that an idea had been born — that man is not adapted to refined carbohydrates and that this maladaptation can explain a wide range of otherwise unexplained metabolic and gastrointestinal disorders In the foreword to the 1969 book[6] Sir Richard Doll wrote

Whether the predictions in this book will prove to be correct remains to be seen but if only a small part of them do the authors will have made a bigger contribution to medicine than most university departments or medical research units make in the course of a generation Eleven years later many of Cleave s predictions are looking very plausible

Burkitt

One who conceives an idea is not necessarily the best one to popularise it The meeting between Cleave and Denis Burkitt in 1965 was a turning point in the fortunes of Cleave's hypothesis Burkitt had many advantages He had worked for 20 years as a surgeon in East Africa and could confirm the rarity of the diseases of civilisation in rural Africans (in this he was strongly supported by his physician colleague Hugh Trowell) As the discoverer of Burkitt s lymphoma he commanded respect from the medical profession all over the world His world wide connections enabled him to confirm Cleave's epidemiological observations[8 10] Moreover he added large bowel cancer and hiatus hernia to the list of gastrointestinal diseases which are peculiar to western civilisation and can be explained by refined carbohydrate[11 12] Together with A R P Walker and N S Painter he amassed statistics to confirm a crucial piece of evidence — that the stools of rural Africans are much bulkier and softer and pass through the gut faster than those of British people — and he had these findings published in the Lancet where they were bound to be noticed[13] (Cleave has been a prolific writer of letters to the Lancet and BMJ but has rarely published full papers — this may be one reason for his delayed recognition) Above all Burkitt was a brilliant and much travelled lecturer which meant that all over the world doctors and scientists began to think and talk seriously about refined diets

Fibre

In the early nineteen seventies a subtle but important change came over the Cleave hypothesis — it became known as the fibre hypothesis In trying to account for the different properties of refined foods compared with their natural or unrefined counterparts Burkitt Trowell and others focussed on dietary fibre This was defined as the indigestible part of plant foods[13 14 15] and was essentially the same as plant cell wall material To reduce to a single word the many differences between refined and unrefined carbohydrate foods was obviously an oversimplification but it certainly facilitated discussion of this new idea Moreover it focussed attention on the positive benefits of unrefined foods Unfortunately many people have equated fibre with wheat bran which is merely a fibre rich preparation of the seedcoats of wheat grains, and a high fibre diet has been equated with adding a few spoonfuls of bran to the existing diet The bran heresy has alluring elements of truth in it Undoubtedly the European wheat based diet used to contain more bran than it does today[16] Adding bran to the present British diet benefits the bowel function of a great many people[17] and usually relieves the symptoms of those with diverticular disease[18 19] colon spasm[20] and haemorrhoids[21] Another beguiling fact is that bran has beneficial metabolic effects, reducing bacterial activity in the colon and improving the composition of bile so that gallstones are less likely[22] Cleave must have watched the rising interest in raw bran with some pleasure because in 1941 he had been one of the first to advocate raw bran in medical practice (after unblocking many bowels on board the battleship *King George* V)[23] But to call his hypothesis the bran hypothesis is as gross a distortion of the truth as to call it the bagasse or sugar cane-fibre hypothesis Cleave does not recommend that we add fibre to our food (except as a laxative) but that we stop taking fibre away from it His message is not the danger of a low intake of fibre but the danger of separating fibre from carbohydrate

Carnivores like the Eskimos eat very little plant fibre but they also eat very little carbohydrate They remained largely free of western diseases until they adopted refined western eating habits[24] This cannot be

explained by a fall in their fibre intake but can be explained by a rise in their intake of fibre depleted foods

Nevertheless fibre is a fertile concept and fibre research is blossoming in many countries including rather belatedly the United States[25 26] But different people have different concepts of fibre and some of the experimental results which are being published are hard to relate to the natural material For example there is no doubt that plasma sugar and cholesterol levels can be lowered by feeding pectin and guar gum — two substances with high viscosity — but the amounts that have to be given are much in excess of what is present in ordinary food In any case guar gum is not a natural component of the human diet and when pectin is eaten in natural form it is so dilute and so intermeshed with other cell wall components that it is questionable if it can have much effect It is quite unjustified to extrapolate from the effects of pure components of dietary fibre to those of natural fibre rich foods The very act of extraction alters the properties of fibre Perhaps we should think of fibre as the undigestible wrapping round plant nutrients and seek to discover its role by comparing natural fibre rich foods with their refined fibre depleted counterparts For example the carbohydrates in apple juice induce an excessive insulin response and rebound hypoglycaemia if the juice is extracted from the apple but not if the intact apple is eaten[27] The physical state of fibre is also important If whole apples are pureed they induce a greater insulin response[27]

Unwitting Overnutrition

Cleave's case against refined carbohydrates goes further than their failure to provide fibre for the gut Their changed physical state makes them inherently prone to be overconsumed Being soft or even soluble in water they are abnormally quick and easy to consume and do not satisfy the appetite so much as their natural fibre rich counterparts Another way of looking at this is to say that dietary fibre is a natural obstacle to energy (calorie) intake slowing down the ingestion of food and limiting the amount ingested by inducing the feeling of satiety[27 28] Cleave reasoned that the person who satisfies his appetite on refined foods inevitably consumes more energy than he needs without consciously overeating There is experimental evidence to support this idea[28 29]

Unwitting overnutrition has consistently been put forward by Cleave as the most serious effect of refined carbohydrate The profession has been slow to accept this part of his hypothesis which contrasts strangely with its enthusiasm for fibre This disinterest is surprising because the disorders which are associated with overnutrition are amongst our most serious diseases They include diabetes hyperlipidaemia hypertension gallstones gout cardiovascular disease and cancer of the colon uterus and breast Cleave has called overnutrition the most dangerous cause of disease in westernised countries[30] His recognition will not be complete until there is agreement on this point and on the major role played by refined carbohydrate in overnutrition

Simplicity

To some doctors and scientists Cleave's hypothesis is too simple to be true To others it smacks of health food faddism and the cult of the noble savage or back to nature Cleave is unmoved by these criticisms To him simplicity is the essence of truth He likes to quote the great nuclear physicist Lord Rutherford who said that 'if a theory is any good it should be understandable by an ordinary barmaid' Going into the attack Cleave observed that 'medical minds these days are so preoccupied with detail that they have lost

the art of repeatedly standing back in order to gain perspective and think more simply in terms of fundamentals Conclusions reached in this way are discounted because they cannot be proved to the last particular'

Nature

As for invoking nature far from being apologetic about this, Cleave states emphatically that respect for nature is at the very heart of his philosophy His 1956 article in this journal was entitled The Neglect of Natural Principles in Current Medical Practice'! His central assumption and surely a reasonable one is that man's body is as well adapted to its natural environment as that of any other species of animal. Therefore when organs of the body fail prematurely the cause should be sought in unnatural factors in the environment not in enzyme deficiencies or other inborn defects It follows that diseases of this kind are prevented or arrested (and if reversible treated) by removing the unnatural factor in the environment — be it tobacco smoke excessive noise or excessively processed foods Cleave urges reverence for the body which despite its unbelievable complexity is extremely efficient and well able to mend itself Let not doctors think that they ever heal a diseased body they merely create the conditions in which it can heal itself In other words they simply assist nature Any attempt to frustrate or outwit nature is doomed to failure in the end As the Roman poet Horace said You may drive out nature with a pitchfork but she will ever hurry back to triumph in stealth over your foolish contempt'

Conclusion

Others have blamed sugar and white flour for various diseases but Cleave was the first to see the unity of refined carbohydrates and by simple logical argument to demonstrate their enormous potential for explaining the diseases of civilised man His writings have been largely responsible for the present intense interest in dietary fibre If his ideas are only partly correct a return to more natural unprocessed foods could be the single most effective public health measure available to civilised man

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The Diagnosis and Prognosis of Upper Gastrointestinal Haemorrhage*

R H Hunt

ABSTRACT

There have been major advances in the diagnosis and management of upper gastrointestinal bleeding over the past two decades but the overall mortality figure remains about 10 per cent. This paper reviews the place of upper gastrointestinal endoscopy in diagnosis and discusses the argument that this form of earlier more accurate diagnosis has had no influence on the outcome of the condition

Introduction

Gastrointestinal haemorrhage continues to be both a significant diagnostic and management problem In the United Kingdom it is estimated that 47 admissions per 100 000 are for upper gastrointestinal bleeding [1] At the Royal Naval Hospital Haslar there are on average one to two such admissions per week The overall mortality rate has remained relatively constant at about 10 per cent for more than 20 years in spite of significant changes in patient management [2] These changes have included the establishment of intensive care units with readily available blood transfusion and monitoring facilities for blood pressure blood volume and central venous pressure There have also been advances in anaesthetic techniques and surgery

Advances in diagnosis have included improvements in radiology especially the use of the double contrast barium meal but the most significant advance over the past decade has been in the development and widespread use of fibreoptic endoscopy This technique is now considered to be at least potentially more accurate for the diagnosis of acute upper gastrointestinal haemorrhage [3] However it has been questioned whether the move to emergency endoscopy and a more precise and earlier diagnosis has altered patient management and improved the prognosis

Endoscopy and Radiology

The relative success of both endoscopy and radiology depends upon the skill and experience of the examiners but nevertheless endoscopy has been shown in a number of studies to provide a more precise diagnosis than emergency radiology and especially to indicate whether a known lesion is the source of active haemorrhage [4-8] Superficial and mucosal lesions such as Mallory Weiss tears oesophagitis gastritis and gastric erosions may be more readily seen at endoscopy

Amongst the earlier reports comparing endoscopy with radiology there were few that were unbiased and the shortcomings of the barium meal were emphasised by those patients who were selected for endoscopy because of unhelpful radiology A prospective study [8] of the double contrast barium meal compared with fibreoptic endoscopy in acute upper GI haemorrhage in 53 consecutive patients showed the

*Based on an invited paper presented at the Robert B Brown Surgical Symposium National Naval Medical Center Bethesda Maryland USA on September 27 1979

superiority of the double contrast barium meal over the conventional barium meal used in other series Among the 50 patients with a final diagnosis of a bleeding lesion in the upper gastrointestinal tract endoscopy indicated the site of bleeding in all and radiology in 88 per cent of the patients The three authors of whom two were radiologists concluded as have most workers that endoscopy is the investigation of choice but that when this facility is not available then double contrast radiology will show the bleeding in 80 90 per cent of patients In this context it has been pointed out that expert radiology may be as good as inexperienced endoscopy [10]

The use of fibreoptic endoscopy for diagnosis has altered the emphasis placed on lesions as a source of bleeding This can be seen by comparing the diagnoses from a radiological and endoscopic series in Table I [1 4]

TABLE II CAUSES OF UPPER ALIMENTARY HAEMORRHAGE %

Investigation	Series	Radiology	Endoscopy	Endoscopy
		1961	1965	1968
		341		204

Plus Rare [illegible] Co [illegible]

The incidence of Mallory Weiss lesions at 1 per cent in the series of Cotton *et al* [4] is low compared to that reported in other series In California [11] they are reported to occur in 14 per cent of patients with upper gastrointestinal bleeding and 77 per cent of these were observed in the fundus of the stomach In Leeds [12] Mallory Weiss lesions were seen in 21 of 157 patients (13 4%) When endoscopy is performed within the first 24 hours after admission to hospital the endoscopist has a greater chance of making a diagnosis Gastric erosions stress ulceration and Mallory Weiss lesions may all heal rapidly and thus be missed if endoscopy is delayed

Endoscopy and Prognosis

In patients presenting with upper gastrointestinal bleeding the prognosis depends upon such clinical parameters as the age of the patient the size of the presenting bleed and the initial haemoglobin the presence of cardiovascular shock the interval between the first and subsequent bleeds and whether the patient presented with haematemesis or melaena [1 13]

The prognostic value of the endoscopically assessed stigmata of recent bleeding has been shown in a study of 277 bleeds in 233 consecutive patients [14] Stigmata of recent bleeding were considered to be present if there was evidence of

1 Fresh bleeding
2 Fresh or altered blood or black slough
3 A protruding vessel

Lesions bearing stigmata were seen in 69 per cent of patients endoscoped within 12 hours of admission and were more likely to be seen in cases of duodenal ulcer Mallory Weiss lesions and oesophageal varices After longer intervals stigmata were as common in cases of gastric ulcer In the absence of stigmata only 1 of 21 (4 8%) duodenal ulcers re bled compared to 15 of 27 (56%) with stigmata present The results with gastric ulcer were similar where 10 of 33 (30 3%) of lesions showing stigmata of recent haemorrhage re-bled

The correlation of clinical and endoscopic findings by multivariate analysis based on six items of patient data available on admission has been reported in 66 patients with upper gastrointestinal haemorrhage [15] This has shown that over 50 per cent of patients classified into a high risk category continued to bleed or re bled compared to only 1 patient of 33 in the low risk category

The mortality in the high risk group was 21 per cent compared with no deaths in the low risk group The addition or subtraction of the early endoscopic findings made little difference to the accuracy of prognosis

Does Endoscopy Influence Outcome?

Such results as these have questioned whether improved diagnosis can influence the mortality and management of patients with upper gastrointestinal haemorrhage[16–18] especially as mortality has remained static for over 20 years Allan and Dykes[2] have shown however that mortality rates in Birmingham have remained constant over a period during which the average age of the patient has been steadily increasing They suggest that the mortality rate is improving and conclude that early diagnosis is important

Three studies[7 15 20] have attempted to look at management and mortality prospectively in groups diagnosed by endoscopy or radiology

In the first study of 76 patients[7] there was a significant improvement in the clinical diagnosis and management of the patient as a result of the endoscopy findings, whereas in the group diagnosed by barium meal the diagnosis was not improved and indeed this approach resulted in a significantly adverse patient management

Dronfield and his colleagues in their study of 318 patients[15] found the diagnostic yield at endoscopy was higher than in the radiology group but there was no advantage in mortality or the length of hospital stay They doubted that an emergency endoscopy facility was necessary where the radiological services were already adequate.

In an ongoing study of 176 patients by Peterson and his colleagues[20] there was no significant difference between the groups submitted to early endoscopy or who had no endoscopy with respect to age severity of bleeding blood transfusion, alcohol intake or cirrhosis There was no significant difference between the two gronps in terms of rebleeding death or hospital stay although slightly more patients from the early endoscopy group were submitted to surgery

At the end of one year no difference was seen between the groups with respect to a further haemorrhage further hospitalisation or death related to bleeding

Conclusion

The exact place of diagnostic endoscopy in acute upper gastrointestinal haemorrhage remains unclear Fibreoptic endoscopy is a superior diagnostic technique and few surgeons are happy to proceed without the information which can be obtained from endoscopy but nevertheless further exacting studies are needed to define those advantages which might lead to shorter hospitalisation and improved survival The progress of therapeutic endoscopy is advancing rapidly and is likely to make its own contribution to the management of patients now that both electrosurgical and laser techniques of haemostasis are being more widely applied

Until such time as the role of diagnostic endoscopy is clear, it seems wise for the naval physician and surgeon to use that technique which will provide the most accurate diagnosis with which to formulate their plan of management especially when surgery may be required

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Multiphasic Screening: Report on Naval Study 1975-1979

T. R. W. Hampton

Introduction

In its preliminary report in 1974 the Working Party on Naval Medical Standards set up by the then Medical Director General (Naval) recommended the institution of a programme of multiphasic medical screening for naval officers over the age of 40. The purpose was to assess the incidence and significance of undiagnosed disease in this group and to evaluate the potential of multiphasic screening in the Service. The recommendation was accepted and the study was instituted in January 1975.

The programme continued intermittently until August 1979. It was interrupted once by financial constraints and twice by the temporary lack of a suitable medical officer to conduct it. The purpose of this paper is to report the results.

Method

The study was performed in London in a purpose built commercial unit devoted exclusively to multiphasic medical screening. The original intention that one medical officer should conduct the whole study succumbed to Service exigencies and at various times three Surgeon Commanders were involved of whom one saw 66 per cent of the subjects, one 20 per cent and one 14 per cent.

The subjects were volunteers obtained by the President of the Admiralty Medical Board who circulated all MOD(N) Departments in London explaining the purpose and nature of the study. In each case the results were forwarded to the President AMB for filing in the officers F Med 4 and an additional copy was retained on microfiche.

Each subject was screened by a standard series of technical investigations and by clinical consultation and physical examination. The investigations used are listed below. Blood was taken after a 16 hour fast.

Height	Urinalysis
Weight & % variation from predicted	Haemoglobins & ESR
Visual acuity	Blood urea & electrolytes
Colour vision	Liver function tests (including enzymes)
Audiometry	Cholesterol & triglycerides
Chest X ray (PA & L Lateral)	Uric acid
Plain X ray abdomen	Blood sugar
ECG	Serum iron
Vitalogram	

Following a self administered health questionnaire, posed and answered at a computer linked visual display unit and subsequently printed out, each patient was seen for clinical consultation.

A standardised and detailed life and health history was taken, starting with the patient's childhood schooling, early career and training, and continuing with his current work, including a detailed analysis of his daily time table and commitments, his personal reactions to his responsibilities and his views about his future. His recreational and social activities were then analysed followed by his parents' social and medical history and his domestic and marital status and relationships. His previous medical history was then recorded and finally his current health was

investigated Opportunities were created for the patient to express any dissatisfaction with his health or with his life and work situation and style The interview occupied 45-60 minutes and was recorded by detailed handwritten notes on a proforma Full general physical examination was carried out and recorded A written assessment was recorded of physical health, emotional status personality presence or absence and degree of stress and quality of reaction to it and finally a summary of positive findings At the end of the consultation any problems were discussed with the patient and appropriate advice was given

After the results of investigations had been received a letter was written to the patient giving such further advice as might be necessary and making arrangements for any medical management which was needed

Results

Five hundred and twenty three patients attended Twenty of these made subsequent review visits at their own request Only first visits have been considered in collecting results The age and rank distribution of subjects is shown in Table 1 Naval equivalent ranks have been used throughout (eg for Royal Marine Officers) Six patients were women

Table 1

Age	Flag Officers	Captains	Commanders	Lt Cdrs	Total
31-40		6	27	2	35
41-50	0	124	210	50	399
51-60	26	40	20	3	89
TOTAL	32	170	266	55	523

Table 2 lists the yield of abnormalities from technical investigations Overweight is included here for convenience

Table

Over weight (>10%)	Hyperlipidaemia	Hearing loss	Blood biochemistry	Abdominal X-ray	ECG	Urine protein
5	65	145	0	0	1	1

Hyperlipidaemia was defined as a fasting cholesterol above 280 mgs % or fasting triglycerides above 180 mgs % or both Of the 65 discovered 12 were more than 10% overweight Hearing loss included only those whose hearing was a cause of complaint and whose audiometry confirmed significant loss In addition, significant audiometric impairment (more than 25 decibels impairment at two or more frequencies in either ear) was found in 145 patients who had no complaints Blood biochemistry abnormalities included liver function test disturbances and raised uric acid levels No abnormality was found in blood urea electrolytes blood glucose or serum iron Abdominal X ray abnormalities included seven patients with previously undiagnosed radio opaque gallstones Two of the three abnormal ECGs showed ischaemia and in one of those a history of angina had been obtained Several borderline ECGs were classified as normal after further investigation including post exercise ECGs One abnormal urinalysis showed haematuria and the other heavy proteinuria No instance of glycosuria was found No chest X ray revealed a previously unknown abnormality All haemoglobins and ESRs were within the normal range

Vitalogram results showed a predictably wide scatter and are not included in the tables because "abnormality" is difficult to define and because no previously unknown respiratory disorder was revealed by this technique The results were however reviewed making the empirical assumption

that impaired function existed with a reduction of more than 10 per cent below predicted levels of either FEV_1 or FVC On this assumption there were positive results in 44 out of 92 smokers (48%) and 162 out of 431 non-smokers (37%)

Table 3 lists the yield of problems discovered at clinical consultation Major

Table 3

PHYSICAL DISORDERS		EMOTIONAL DISORDERS	
Major	Minor	Major	Minor
22	64	7	73

physical disorders were defined as those requiring hospital assessment and management, either on an in patient or an out patient basis They comprise a wide variety of conditions such as severe hypertension angina of effort orthopaedic disorders hernia prostatic hypertrophy asthma and malignant melanoma

Minor physical disorders implied a need for treatment and/or surveillance by the patient's own doctor with or without specialist advice and they included dermatological and ENT conditions haemorrhoids and varicose veins not yet requiring surgery untreated migraine and borderline hypertension None of these significantly impaired function or implied medical downgrading

The group of major emotional disorders included patients with disabling symptoms of nervous or emotional origins sufficiently severe to require temporary removal from work and/or specialist advice and/or treatment with psychotropic drugs beyond simple hypnotics

Patients classified as having minor emotional disorders presented physical or nervous symptoms considered to be of emotional origin which were not disabling but which were disturbing and troublesome to the patient Some required simple treatment such as hypnotics and surveillance by their own doctors and in some cases discussion explanation and advice at the time of consultation sufficed

An attempt was made to relate emotional symptoms to the presence of external stress factors Grading the level of stress proved to be an almost impossible semantic task. It is a subjective judgement and one man s stress is another man s stimulus so that an individual whose response to pressure is effective and untroubled will thrive on it. An approximate technique was used to balance magnitude of pressures against quality of response the residue of the equation being noticed as the presence or absence of major stress The results are expressed in Table 4

Table 4

Stress without symptoms	Stress with symptoms	Symptoms without stress
80	46	14

There were additional patients not included as 'abnormal' in any of the above lists such as the obese and some with unwise life or work styles who were considered to be in need of advice to protect their present or future health

Bringing all groups together including those whose hyperlipidaemia was sufficiently severe to justify hospital surveillance and those whose deafness appeared to justify referral for a hearing aid. the total in whom therapeutic action was taken was 119 Those who required no action but needed medical advice totalled 176 Some patients had more than one significant condition

Discussion

Attempts to analyse the incidence of various abnormalities according to age or rank have proved unprofitable Table I

shows that the classification of subjects by rank or by age produces grossly unequal groups Hence for example the yield of physical abnormality on clinical assessment was 14 per cent under age 40 17 per cent between 40-50 and 21 per cent over 50 and these findings would be expected from the natural history of disease but the figures do not have statistical significance The results have therefore been examined as a single group

Similarly an detailed nosological breakdown of physical findings is offered since the incidence of individual conditions is very small and has no statistical relevance in a total number as low as 500 For example although it is perhaps slightly surprising to detect no diabetics in a study of this age group it is not significant There is however justification in discussing some of the individual findings in more detail

To discover that 11 per cent of middle aged men in sedentary occupations were more than 10 per cent overweight was better than might have been expected The finding and the advice which followed it owed nothing to multiphasic screening techniques

Twelve per cent of patients showed various degrees of hyperlipidaemia The figure was a little lower for this age group than in many populations surveyed but definitions of normal vary The value of the finding is contentious A high cholesterol is known to be a coronary risk factor and some cardiologists argue powerfully for vigorous advice and therapy to lower it It remains uncertain however whether atheroma is reversible Undoubtedly hypercholesterolaemia must be considered in conjunction with other coronary risk factors when giving advice In severe hereditary hyperlipidaemias the condition is readily diagnosable by 30 and it may be said that discovering it in the forties is too late High triglycerides may reflect inappropriate diet including excessive alcohol intake and together with other findings may indicate the need for strong advice

The audiometric findings were disturbing but not surprising By age and occupation this group had a high incidence of exposure to high intensity noise such as gunfire jet engines etc at a time when its hazards were not widely recognised and when protection was inadequate In every case the loss was in the high frequency range and suggested in the absence of other causes accoustic trauma The problem is now well understood It is not yet certain whether present protection techniques will prove completely effective

Abnormalities in blood biochemistry were nearly all minor in degree It was possible to link liver enzyme disturbances with alcohol intake and to advise accordingly In one case with gross enzyme disturbance there were additional reasons to suspect a markedly excessive alcohol intake The suggestion was met with blank denial but repeat liver function tests in two months reverted to normal One s conclusions must remain speculative One raised uric acid was thought to elucidate an arthropathy and to allow suitable management Others indicated passive surveillance

Referral for consideration of cholecystectomy followed the discovery of gallstones on plain X ray of abdomen If the surgical precept is true that the presence of stones is an indication for cholecystectomy then the finding was valuable

The ECG is known to be a poor predictor of coronary disease in the asymptomatic As a blanket screening test its value is therefore doubtful as the results of this study confirm Its use in high risk groups such as aircrew is however accepted Clinically an ECG in early adult life may be of subsquent clinical value in allowing differentiation between minor congenital variations and pathological developments

There were only two positive findings on

urinalysis which is the most universally accepted of all screening procedures. This illustrates well the fact that screening techniques with very low yields can and will be used if they are cheap, quick and easy.

The clinical yield of 22 patients (approximately 4%) with disorders requiring major therapeutic action was far from sensational but may be regarded as useful.

It must be added that all were capable of discovery by the combination of an accurate medical history and a competent, conventional physical examination. The latter is also true of the 64 (12%) lesser physical findings. Their discovery can be argued to have two merits. Firstly, it may allow simple early therapy to resolve discomfort and anxiety. Secondly, the possession of sound information on the natural history of a minor disorder and on the developments which may indicate the desirability of further medical advice equips a patient to manage his own condition sensibly competently and without stress.

In discussing the emotional disorders discovered the major group presents little difficulty. It comprised diagnoses which will be readily agreed such as depression with classical sleep disturbance, mood impairment, concentration difficulties, guilt feelings etc. or marked anxiety states with physical agitation, chronic insomnia and progressively impaired work performance etc. These were easy to identify and relatively easy to manage since they required major therapeutic intervention. They allowed prevention of worse consequences both for the patient and for the Service, as for example when a forthcoming move to a taxing remote and vulnerable appointment was cancelled.

The minor group presents greater difficulty. What is the definition? A yield of 73 (14%) is high, so are the criteria too sensitive? How subjective is the assessment and does the patient's or the doctor's view predominate? How can one attach a quantitative measurement in this area? To what extent does a doctor find trouble because he is seeking it? These justifiable questions mean that the findings are highly vulnerable to and almost defenceless against destructive criticism. Nonetheless they are important and require discussion.

Briefly, a positive diagnosis was made if the patient had symptoms which were distressing but manageable and which were not of physical origin. Those who were merely unhappy with their work or their lifestyle were excluded. Presentations varied widely. Some had physical conversion symptoms such as tension headaches or atypical dyspepsia. An intermediate group had minor and various physical symptoms associated with disproportionate hypochondriasis. Some complained of deteriorating performance at work or generally or sexually. Others were troubled by frankly nervous symptoms such as tension, unjustifiable anxiety and intermittent insomnia. A few were aware of increasing recourse to alcohol for symptomatic relief. In some discussion, explanation, reassurance and counselling at the time were thought to suffice and in others the temporary use of simple hypnotics or of small doses of mild anxiolytics was appropriate with subsequent review by their own doctors.

The aetiology lay in the combination of inherent personality and external circumstances in infinitely varying proportions. The anxiety prone and the rigidly obsessional were obviously more vulnerable. At the other extreme major difficulties were sometimes stoically sustained such as serious family illnesses, chronic marital disharmony and insoluble work conflicts. Table 4 has indicated crudely that stress and symptoms do not necessarily coincide but an attempt to define more exactly the kinds of stress most

likely to be damaging would require a much more sophisticated study One's clear impression however is that large volumes or long hours of work are not necessarily damaging (except perhaps for recurrent jet lag) and that the stress which most people find hard to tolerate is chronic frustration

The value of revealing and managing these early and relatively minor problems lies in allowing insight and symptomatic relief to break the vicious circle in which stresses anxieties and symptoms are mutually exacerbating

This study was expensive occupying 110 doctor days and costing some £30,000 for the hire of facilities Additional doctor days were taken up in learning the techniques of extended consultation in well person screening

Conclusions

Historically screening techniques have been chosen either because they are cheap and easy or because of a need to detect serious common conditions Urinalysis has long been in the first category and with the advent of autoanalysis blood biochemistry is rapidly entering it Cervical cytology is an example of the second category as was mass miniature radiography at one time Expressed as percentages positive yields have usually been low in both categories Pressure to abandon procedures results when substantial investments give a very low yield as is now the case with mass radiography Meanwhile the search for new screening possibilities proceeds and will continue so long as the hope of improved health from earlier diagnosis is sustained

The use of an almost random collection of tests selected because they are possible practicable and available has acquired the title of multiphasic screening The naval study used this particular batch of tests not in the expectation of a high yield but because it was there Results are to be interpreted against this background and in the knowledge that ours was an allegedly fit group regularly subjected to medical assessment The question is therefore not the size of the yield but its value

Hyperlipidaemia is common in this study as in others The value of correcting it in our age group is uncertain It is likely that the value of discovery and correction would be greater at the age of 30 It is a useful adjunct in revealing and therefore potentially correcting dietary excesses

Early deafness might have been predicted as a common finding in this group Individuals did not benefit from its discovery since the condition is not remediable The findings have however reinforced the known need for protection They would also support any proposals for close audiometric monitoring in vulnerable groups since this is the final test of effective protection

Disturbed liver function tests in the asymptomatic are likely to reflect remediable rather than irreversible hepatic dysfunction Our population is particularly exposed to the use of alcohol and some livers are known to be more vulnerable than others to its ill-effects There is therefore scope for effective prophylactic advice here despite the fact that most of us are reluctant to discuss alcohol because of our belief that we use too much ourselves Other biochemical parameters have not proved valuable in this study

Asymptomatic gallstones were found on straight X ray of abdomen in seven patients A definitive surgical opinion is desirable on the value of detecting symptomless stones despite the common knowledge that a gallbladder is more easily removed if it has not been previously inflamed It might be argued that there is now a stronger case for routine abdominal X ray than for routine chest X-ray although the common radiolucent stones would be missed

The resting ECG is a poor predictor The

best argument for its use as a screening tool is the clinical value of a pre-morbid record in subsequent illness. It is not expensive and naval facilities for recording it are widely available. Despite few positive findings urinalysis is too cheap, easy and quick to be abandoned as a screening procedure.

In our group assessment of haemoglobin has not proved valuable although it is known to give a significant yield of treatable abnormality in women of reproductive age. Our pre-screened population had no need of visual acuity or colour vision measurements. Vitalography in the asymptomatic is only important in groups with specific risks such as submariners.

Turning to clinical assessment the major physical and emotional disorders totalling 29 or 6 per cent might alone be said to justify regular medical assessment in our age group—as a service to the patient and as a protection for the Navy.

The minor disorders totalling 137 or 26 per cent are perhaps even more important because they reveal the magnitude of the opportunity for prophylactic health counselling. They strongly imply the perhaps unfashionable notion that a properly conducted clinical consultation for the ostensibly well has to be learned. It is not difficult but it is quite different from that applied to the sick. It is almost impossible to teach in abstract theory but is quickly acquired by first hand experience. It is time consuming but it is rewarding.

For the individual patient it is the sum total of information acquired that allows health counselling and therefore preventive practice. The history of his life and health to date, his work style problems, smoking, drinking, obesity, technical data etc. create a unique individual with unique hazards and illustrate at each consultation that health education and preventive medicine can only be effectively practiced in an individual doctor patient relationship.

The study has shown that some multiphasic screening techniques have a contribution to make in assessing the present and prospective health of this age group but that careful clinical assessment remains the most valuable single tool. It has also shown in this group that to achieve adequate delivery of health care to the patient and adequate protection of the Service against health problems some form of medical screening remains necessary.

A study such as this is vulnerable to the glib criticism that the only normal patient is one who has been inadequately investigated. However it is in the nature of man to be concerned with his health and its preservation. Moreover the medical profession encourages him to look for prevention and for timely remedies and it must therefore help him to find them. Thus in the Service where it is one of the responsibilities of the Medical Branch to contribute to morale by carrying high quality health care to the patient we must make a positive response to the challenge of health screening and health counselling.

In retrospect it is unfortunate that no formal provision was made to assess patient reaction but the popularity of the scheme was indicated by the rapid increase in demand for it as well as by letters received. It appeared that what patients valued most was the opportunity to air previously unspoken anxieties and uncertainties about their life, health and future. The relaxed and unhurried circumstances of the consultation permitted and encouraged detached reflection and frank discussion. Thus were many medical molehills flattened before they became mental mountains. This group was perhaps particularly in need of such a service. Firstly it was of an age at which crises of confidence are common. Secondly it comprised men who were under considerable pressure of work and responsibility while living in adverse domestic circumstances. Nonetheless this aspect of screening is not to be decried for it

offers simple relief of much distress It has been said and should sometimes be recalled that the role of a physician is rarely to heal often to alleviate and always to comfort

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Physiological Aspects of Naval Problems*

E. E. P. Barnard

Introduction

Physiological research in the Royal Navy has a long history and one moreover which shows a clear trend towards self sufficiency—a trend from the use of civilian experts to carry out the research towards the provision of naval research facilities and the training of naval medical officers in research methods. This year has seen the opening of new laboratories and the establishment at the Institute of Naval Medicine of a Department of Physiology, a development or continuation rather than a beginning, of an activity which has involved many individuals, problems, institutions and buildings.

Early Naval Research

Diving

Prior to the 1939–1946 war problems needing research were dealt with by establishing committees such as the Admiralty Deep Diving committees of 1906 and 1930 to which eminent scientists were appointed.

The 1906 Admiralty Deep Diving committee was established to study two problems: first, the tendency of divers to become unconscious when working hard at depths greater than about 27 metres (circa 80 ft) and, secondly, to develop a way of preventing the paralysis or death associated with severe cases of decompression sickness. Both of these problems were put into the hands of Professor J. S. Haldane who solved the first by a redesign of the pumps: this ensured an adequate supply of fresh air to flush out the expired carbon dioxide which formerly had accumulated in the diver's helmet. Haldane also carried out a theoretical analysis of the uptake of nitrogen by the body during diving and developed the stage method of decompression which is still largely used today.

The 1930 Diving Committee extended the Haldane system of diving to 100 metres (circa 300 ft) and in conjunction with Siebe Gorman & Co. Ltd. tested the use of a submersible decompression chamber in which oxygen could be breathed by the diver during decompression in order to hasten the elimination of dissolved nitrogen from the body.

Escape from sunken submarines

The foremost British manufacturer of diving and other breathing equipment during the 19th and early 20th century was Siebe Gorman & Co. Ltd. This firm under its managing director Sir Robert Davis had the foresight to set up research and testing facilities and they were closely associated with naval undersea problems between the wars.

The Davis submarine escape apparatus (DSEA) developed at Siebe Gorman's was adopted by the navy and in 1931 was used successfully by six of the men who went down in HM Submarine *Poseidon*.

*Based on a paper given at a meeting on *Physiology and the Royal Navy* held at the Royal Society of Medicine (United Services Section) on December 6 1979.

Flying

During the 1914-18 war naval medical officers were attached to units of the Royal Naval Air Service which in 1918 amalgamated with the Royal Flying Corps to become the Royal Air Force

A naval medical officer active at this time was later Medical Officer in Charge of the Royal Naval Medical School from 1930 32 and Medical Director General (Naval) in 1939, to the foresight and energy of Surgeon Vice Admiral Sir Sheldon Dudley we owe much not least the close association which we have had since 1941 with the Medical Research Council

The Royal Naval Personnel Research Committee

In 1941 in order to mobilise physiologists and others to study the problem of survival the committee on the care of shipwrecked personnel was set up under the chairmanship of Sir Sheldon Dudley Shortly thereafter at the request of the Board of Admiralty the Medical Research Council set up the Royal Naval Personnel Research Committee (RNPRC) under the chairmanship of Sir Edward Mellanby

The Royal Naval Personnel Research Committee set up several small research cells at the Applied Psychology Unit Cambridge the National Hospital Queen s Square Hampstead and elsewhere The Admiralty Experimental Diving Unit grew from the unit led by Surgeon Lieutenant Commander K W Donald at Siebe Gorman s and the present Admiralty Marine Technology Establishment (Physiological Laboratory) began as a small physiology laboratory at *HMS Dolphin* studying problems of submarine escape and underwater blast

The range of problems tackled was considerable for example survival lifeboat rations methods of flotation oxygen toxicity the energy cost of naval tasks and the problems of heat in gun turrets

Furthermore several of the members of these research teams remained associated with naval research Professor Sir John Gray Professor Sir Lindor Brown Professor Sir William Paton Professor K W Donald Professor Romaine Hervey and Professor William Keatinge are some of those who began a long association with the RNPRC during the war years

Post-war Research

Aviation research

With the re emergence of the Fleet Air Arm in 1939 the Navy again needed medical officers with a knowledge of flying and five officers were trained as pilots at Pensacola in Florida between 1942 and 1944 The Royal Naval Air Medical School was established in March 1944 at Eastleigh moved to Gosport in 1947 and took on survival training in 1948 with the establishment of a safety equipment and survival training school In 1959 medical officers were again appointed to Pensacola as exchange officers with the US navy but the exchange was transferred from aviation to underwater medicine in 1967, since when the Institute of Naval Medicine has had close links with the Naval Medical Research Institute at Bethesda Maryland The survival medicine section was transferred from the Royal Naval Air Medical School to the Institute of Naval Medicine in 1978 and incorporated into the Physiology Department this year This section is still active in the testing and development of protective clothing and liferafts Close liaison exists with the Institute of Aviation Medicine Farnborough and naval medical officers have been attached there since about 1943 up until the present time The work done has been wide-ranging involving the development of protective helmets for aviators and methods of underwater ejection to select only two examples from a wide range of projects

Climatic physiology

Climatic chambers were established at the National Hospital Queen Square probably in 1943 but the ward space used reverted to the care of patients at the end of the war The unit during this time had researched aspects of heat of particular interest to the Army so that when a naval research unit was finally established in Singapore in 1948 it was staffed from both the Army and the Navy The Director of the Tropical Research Unit for the five years of its existence was Surgeon Commander Frank Ellis who had been the naval medical secretary to the RNPRC from January 1944 and who as the Medical Officer in Charge of the Royal Naval Medical School proposed the building of the Environmental Medicine Unit at the Institute of Naval Medicine within which much of the present experience in physiological techniques has been gained

Underwater medicine

The problems of diving and submarine escape became almost the only areas of research carried out by the Royal Naval Physiological Laboratory from its foundation until quite recently Associated with this work was a succession of medical officers who were attached to RNPL both to carry out research and to give medical cover for experiments involving naval personnel This relationship persists but there is now a clearer division between doctors and research workers and although all medical cover is provided from the Physiology Department of INM only one medical officer is currently working on diving research projects for AMTE (PL) Current methods of submarine escape and the naval diving tables for both short and long dives are recent developments to which naval medical officers and United States Navy exchange officers have contributed

In conclusion applied physiology has two aspects first the solution of existing problems to which the following papers relate and secondly the anticipation of future problems which needs up to date knowledge and experience of naval operations The scarcest resource is always likely to be a sufficient number of individuals with the motivation towards problem solving which this work requires

Lean Long Distance Swimmers*

F. St C. Golden, I. F. G. Hampton and D. Smith

ABSTRACT

The tolerance of long distance swimmers to cold water has in the past been attributed to the insulation afforded by subcutaneous fat. In this paper evidence is presented to show that swollen wasp and distance swimmers are relatively lean. Habituation changes in core, shoulder and thigh temperatures were monitored during water immersion and swimming.

Introduction

The insidious onset of general hypothermia is a well recognised limiting factor to survival in cold water. Tolerance times for the general population have been predicted from analysis of shipwreck incidents[1] and experimental work.[2] However, in common with other generalisations on physiological responses, there is a considerable individual variation in the rates of body cooling encountered during immersion in cold water.

One obvious explanation for variation in cooling rates during immersion is the differences in subcutaneous fat thickness and consequent tissue insulation. The classic experiments conducted by Pugh and Edholm[3] on Channel swimmers in the early 1950s emphasised the value of tissue insulation. They concluded that the tolerance of long distance swimmers to cold water may be attributed to their unique combination of physical fitness and subcutaneous fat thickness. The combination of these two attributes enables them to maintain a steady work rate for a considerable length of time and retain much of the heat produced within the body. Subsequently experiments by Keatinge[4] confirmed the insulative value of subcutaneous fat showing a significant linear relationship between rate of change of rectal temperature and 1/mean skin fold thickness in 10 men immersed in water at 15°C. This scientific validation of the explanation previously proposed by Pugh and Edholm[3] appeared to have been the final evidence required to complete the story on the remarkable tolerance of long distance swimmers to cold.

Observation of long distance swimmers prior to the 1974 Windermere international race and skin fold thickness measurements taken from a small sample (n=8) by Golden (unpublished) revealed that current swimmers were not as fat as those shown in the 1955 paper by Pugh and Edholm. (A photograph of the winner of that race is shown in fig. 1.) This observation was subsequently confirmed when, prior to the 1975 race, skinfold thickness measurements — in accordance with the technique described by Durnin and Womersley[5] — were made on all 34 competitors. The results shown in Table I confirmed that the skinfold thicknesses of the male swimmers in particular were within the normal range. This finding suggests that some mechanism(s) other than subcutaneous fat thickness is responsible for the unexpected tolerance of these swimmers to cold water.

Based on a paper given at a meeting on Physiology and the Royal Navy, held at the Royal Society of Medicine, (United Services Section) on December 6, 1977.

Fig 1 Winner of the 1974 Windermere international long-distance swimming race

TABLE 1 The mean skinfold thickness (ST) and standard errors of the both of all 19 swimmers (n = 19) and those competing in the 1974 Windermere International Two Way Swimming Race

	ST (mm)	Body Fat (%)*
Males (n = 25)	12.6 ± 0.9	10.6
Females (n = 9)	19.5 ± 1.1	19.9

* Body Fat calculated according to formula of Jackson and Pollock (personal communication)[3]

In pursuance of this hypothesis three current long distance swimmers were approached to act as volunteers for an experiment in which body cooling rates during cold water immersion were to be studied. A summary of the results has already been published [6]

Methods

The physical characteristics of the three subjects are shown in Table 2. Both subjects 1 and 2 were accustomed to swimming in cold water whereas subject 3 did all his swimming training in a heated indoor pool. Subject 2 was a member of the English international team and shortly before participating in these experiments was second in the 'Two way Windermere race' a swim of approximately 22 miles distance.

Maximum Oxygen Uptake ($\dot{V}O_2$ max). Following the measurements of physical characteristics $\dot{V}O_2$ max was determined while the subjects were exercising on a bicycle ergometer (Siemens Elema Cycle Ergometer 380B). Oxygen consumption ($\dot{V}O_2$) was determined from continuous sampling of expired air collected in 50 l Douglas Bags analysed in a Parkinson Gowan dry gas meter and Beckman OM 11 oxygen analyser. Corrections for S.T.P. were made by using Carpenter's [7] tables for respiratory exchange. Heart rate was continuously monitored throughout on a Cambridge Cardiac Stress Test System (Cambridge Medical Instruments Ltd).

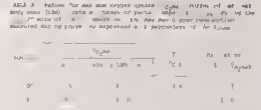
Static Immersion. While seated in a tank of mixed cold water (Tw = 12°C) deep body temperature was monitored continuously with a Grants Instruments rectal probe (accuracy ±0.02°C) inserted 10 cms past the anal sphincter. The ECG was monitored throughout on a Tetronix 412 Portable Patient Monitor and Recorder with a V.D.U. $\dot{V}O_2$ was measured at 15 min intervals as before. The experimental end point was (a) on subject request (b) the appearance of a cardiac arrhythmia (c) a rectal temperature of 35°C. or (d) when in the opinion of an observer subject distress was excessive. Following cooling the cold

water was emptied from the bath and the subject was rewarmed in hot water (Tw = 41°C)

Swimming At a later date the same three subjects were monitored while swimming in Lake Windermere (Tw = 17 4°C) On this occasion deep body temperatnre was monitored at 30 mn intervals by a temperature sensitive intragastric radio pill (Rigel Research Ltd) $\dot{V}O_2$ was measured at hourly intervals with an Oxylog (F K Morgan Ltd) A Spiro Techniqne diver s mouthpiece was nsed instead of the oro nasal mask supplied with the Oxylng eqnipment The turbine flowmeter was inserted in the inspiratory tnbe which together with the expiratory tnbe was attached to a boom held by an observer in a boal alongside the swimmer Thns $\dot{V}E$ and $\dot{V}O_2$ conld be measnred while the swimmer continued swimming

Results

Values for maximum oxygen nptake ($\dot{V}O_2$ max) for all lhree subjects were simular when corrected for variations in lean body mass (Table 3)



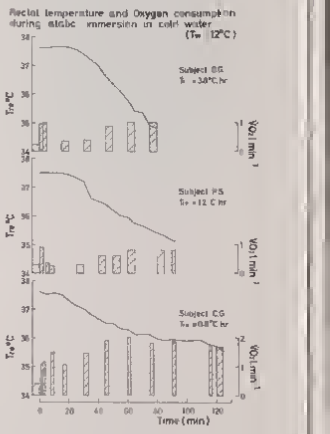
During the static immersion in cold water tha two cold accnstomed swimmers (DG and PS) snbjectively tolerated being immersed better than CG although lheir rate of body cooling (Table 3) was greater than tbeir colleague (CG) despite having greater mean skinfold measnremants (Table 2)

The shivering of the two swimmers accustomed to cold water was barely perceptible while that of CG was vigorous and distressing with the $\dot{V}O_2$ reaching 49 8% of bis $\dot{V}O_2$ max

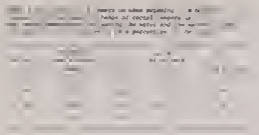
The cold immersion for snbjects DG and PS was terminated after 80 and 92 mins because body temperature had fallen to 35°C (Fig 2) while in the case of CG it was adjndged he had suffered enongh after 126 mins despite a rectal temperature (Tre) of 35 5°C

Fig 2

Rectal temperature and Oxygen consumption during static immersion in cold water (Tw 12°C)



When swimming in Lake Windermere tbe $\dot{V}O2$ of the cold accnstomed swimmers was lower and their swimming speed higher than that of their colleagne CG (Table 4) yet they cooled more slowly Subject CG



rapidly became incapacitated and had to be removed from the water after 130 mins when his rectal temperature was 35 3°C Subject DG swam the length of Windermere while PS who was swimming in the international race the following day and therefore did not wish to over exert himself, left the water after 185 mins After leaving the water he was quite comfortable subjectively and sat in an open boat for the next 40 mins without clothing apart from his swimming costume

Discussion

When the swimmer shown in fig 1 completed the 16½ mile swim in Windermere in 6 hrs 42 mins the water temperature was 15°C The estimated survival time for a fully clothed 70 kg man immersed in water at that temperature would be in the region of 6 hours [1] As swimming has been shown to increase the rate of heat loss[10 11] then survival times of less than 6 hours would be predicted — except in exceptionally fat people Yet in this instance a virtually naked exercising 17 year old boy survived over 6½ hours without apparent ill effect

In the experiment described above, both subjects who were accustomed to cold water cooled more rapidly during their static immersion in water at 12°C and had to be removed after 80 and 92 mins because their rectal temperatures had fallen to 35°C yet when swimming subsequently in Windermere they were able to maintain thermal balance to a degree The swimmer unaccustomed to cold water (CG) on the other hand had a much slower rate of fall of rectal temperature during the static immersion in water at 12°C despite being thinner than his two colleagues yet when swimming in warmer water he cooled much more rapidly

The $\dot{V}O_2$ from shivering during the static immersion of the swimmer unaccustomed to cold water was 49 8% of his $\dot{V}O2$ max a figure similar to that found in a group of 22 unhabituated subjects[12] Conversely the highest $\dot{V}O_2$ recorded during shivering in the two cold accustomed swimmers was only 22% and 26% of their $\dot{V}O_2$ max Keatinge and Evans[13] observed that repeated short duration (20 min) exposures to water at 15°C reduced the shivering response but made no significant difference to the overall rate of body cooling It is possible that the duration of immersion in those experiments was too brief to detect any appreciable change in rectal temperature A similar decrease in shivering response was found by Skreslet and Aarefjord[14] who showed that the $\dot{V}O_2$ of three divers decreased on static immersion for 30 mins in cold water when tested intermittently throughout a period of several months of repeated diving in cold water Again this decrease in metabolic heat production was not associated with a decrease in rectal temperature They concluded that the three divers had undergone an adaptive change attributable to a habituation of the central nervous system They described this change as being similar to the insulative acclimatization described by Hammel[15]

In this experiment however the reduction in shivering response in the two cold accustomed swimmers was associated with a marked fall in rectal temperature suggesting that the adaptive change is more likely to be due to an alteration in the hypothalamic set point rather than some acclimatization process which by its name

imphes the acquisition of some benefit On the other hand, the slow rate of cooling encountered during swimming would suggest some form of acclimatization possibly a peripheral vascular adaptive response Further experiments are currently being conducted to investigate this possibility which could have important applications in diver selection and training

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Pulmonary Function in Royal Navy Firefighting Instructors and Trainees*

J Calverley R F Goad, S J Legg and B. Page

ABSTRACT

Tests were carried out on 18 Royal Navy firefighting instructors and 46 trainees over a period of four weeks in order to study the effect of firefighting training on pulmonary function. Maximal forced expiratory flow volume data was obtained breathing air and oxyhelium. The instructors (but not the trainees) also performed single breath carbon monoxide transfer factor tests. When the tests were tested before and after fighting a single wood fire without breathing apparatus no significant changes were seen in this group as a whole in the flow volume indices. No statistically significant changes in the pulmonary function of the instructors were detected over the course of a working week and over two weekends. The transfer factor per litre of effective alveolar volume fell significantly over a 12 day leave period and did not recover over the first week back at work. It is suggested that this may be related to cigarette smoking. The flow volume indices showed no significant changes over the leave period but over the first week back at work there were significant decreases in FEV_1 and FVC and increases in the FEV_1/FVC ratio and in flow at 75% of FVC. These changes however were not confined to smoke exposed individuals. No significant changes were seen in any of the other flow volume indices measured which included peak flow rate forced mid expiratory flow rate, flows at 25% and 50% of FVC and the ratio of flow at 50% FVC breath taken air and oxyhelium.

It is concluded that over the period studied there is no evidence that pulmonary function is adversely affected by firefighting as carried out at the fire school. Plans for a long term follow-up of the subjects in the present baseline study are described.

Introduction

This study was designed to assess the effects on certain aspects of pulmonary function of firefighting training as carried out at the Royal Naval Firefighting School *HMS Excellent* Portsmouth. Some instructors at the school have complained of malaise breathlessness and increased sputum production at the end of the working week and of non specific respiratory symptoms such as an increased incidence of upper respiratory tract infections (URI) in the winter and a longer than usual time for URI symptoms to abate.

There are very few published studies concerning the pulmonary consequences of firefighting and lung function has invariably been assessed by measurement of forced vital capacity (FVC) and forced expiratory volume in one second (FEV_1). Factors such as concurrent respiratory disease and smoking habits must be taken into account. Sidor and Peters [1] studied 1 768 Boston firefighters over the course of one year and reported an excessive prevalence of chronic non-specific respiratory disease. There was increased mucus secretion and general malaise after exposures to smoke the former being associated with lowered ventilatory capacity. Cigarette smoking also played a part in this decrement. When retested a year later the rate of loss of pulmonary function was more than twice that expected[2] and was significantly related to the frequency of fire exposure.

Thomas [3] found a slight temporary decrease in pulmonary function after exposure to smoke these changes being

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* Based on a paper given at a meeting of the Physiology and the Royal Navy held at the Royal Society of Medicine (United Services Section) on December 6 1979.

greater after exposure to known chemical respiratory irritants Musk [4] observed an acute decline in FEV_1 in firefighters which was related to the severity of smoke exposure and attributed this to reflex or pharmacological effects of irritation of the bronchial tree

It is not known whether chronic changes in lung function are a result of occasional acute exposure to large concentrations of irritant smoke or of frequent mild events with a cumulative effect

Previous studies on subjects operating emergency urban firefighting services have been restricted by the practical difficulties of measuring lung function immediately before and after exposure and the problems of obtaining data on the precise nature of the smoke and the duration of the exposure At the Royal Naval Firefighting School the type of fire duration and frequency of exposure are relatively constant known factors

The purpose of the school is to provide for naval personnel a basic training in firefighting techniques applicable chiefly to fires on board ships Trainees undergo a one two or five day course at the school and training is given in fighting wood diesel oil and rubber fires Instructors are assigned to the school for approximately two years and are exposed to wood and diesel smoke several times a day for most days of the week Neither trainees nor instructors wear breathing apparatus for the wood fires and instructors do not usually wear apparatus for the other types of fire Apparatus (a choice of full face mask compressed air on demand or a free flow hood system) is available but if worn the instructors complain of excess weight and manoeuverability problems (the demand system) or of difficulty passing verbal instructions to the trainees (the free flow system)

Measurements were made of lung volumes and flow rates during maximum forced expirations and of carbon monoxide transfer factor A modified Medical Research Council (1976) respiratory system questionnaire was also included

Mead[5] has shown that extensive small airways abnormalities may be present in the absence of any change in FEV_1 but which may be detected by reduced maximal expiratory flow rates at low lung volumes Recent attempts to determine the site of increased airway resistance in asthmatics and to detect early changes in lung function in young asymptomatic cigarette smokers have introduced an index of pulmonary function which has not yet been applied to the investigation of lung function in firefighters and which seemed appropriate to the present study

As lung volume decreases during expiration the main site of resistance to gas flow moves from the large central airways to the small peripheral airways where in the normal lung flow is thought to change from turbulent to laminar in nature Turbulent flow is determined by both the density and viscosity of the gas mixture breathed Laminar flow is independent of gas density but dependent upon viscosity according to the Poiseuille formula If a gas mixture of similar viscosity but less dense than air (i e oxyhelium) is breathed then the flow ratio (oxyhelium air) at 50% of the forced vital capacity (when the flow is still turbulent) is considered to be an index of pulmonary function which is specific for the calibre of small airways and is independent of lung elastic recoil[6 7] (fig 1)

It was therefore decided to conduct the maximum forced expiratory manoeuvres with the subjects breathing air and then breathing a helium oxygen mixture so that this index could be determined in addition to the more conventional flow volume data

Phase I of this study was conducted in two parts at the school One part involved measurements on instructors repeated at intervals over several weeks The other part

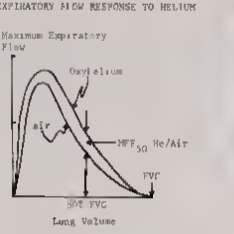

Fig 1 *Maximum expiratory flow response to helium*

involved an acute study of the one day trainees passing through a single wood fire to determine the effects if any of a single such exposure The main aim of Phase I which is reported here was to detect any changes in pulmonary function of instructors that may occur during a working week at the fire school during the weekend and over a period of leave Phase II will involve follow up measurements on instructors at six monthly intervals over the next two years

Materials and Methods

Procedures at the Firefighting School

The fires are set up in large, welded metal units which simulate the compartments of a ship with hatches and metal ladders down which the trainees climb during the course of the exercise (fig 2) The fires are thus usually fought in a small dark and very enclosed space

During a one day firefighting course the instructors are typically exposed to two wood and two diesel fires both morning and afternoon whilst supervising small groups of trainees (maximum 12 men) Limited protection to the respiratory tract is afforded by the wearing of balaclava type cotton helmets with an extension which can be raised to cover the nose and mouth (fig

Fig 2 *Firefighting [illegible] with [illegible] shipboard fires*

3) The trainees do not wear any form of respiratory tract protection for the wood fire exposure but keep low to minimise smoke inhalation

The wood fire exercise involves the team of trainees climbing down a ladder to assemble in a smoke filled compartment adjacent to the compartment containing the wood fire before picking up extinguishers and entering to fight the fire The smoke in

Fig 3 *Protective cotton helmet worn by instructors*

the compartment next to the fire is produced by pots of burning diesel oil so that the trainees are exposed to some diesel smoke as well as wood smoke. The whole exercise takes about eight minutes and is performed once by each group.

The diesel fire exercise consists of one in which the fire is fought at ground level through a doorway using a water wall (no breathing apparatus worn) and one in which the fire is fought from above through a hatch again using a water wall (trainees wear compressed air breathing apparatus full face mask demand). The instructors do not usually wear the breathing apparatus supplied during this exercise because they find it cumbersome and it makes communication difficult. They try to minimise their exposure to smoke by standing at the doorways with brief forays into the compartment to shout instructions to the trainees.

The two day course consists of a first day as above with the addition of a "hot walk" in diesel smoke and a second day in which a "situation exercise" is set up for the whole class. A shipboard fire is simulated one instructor monitoring the exercise from within the compartment and wearing breathing apparatus while three other instructors watch from the outside. If they have to enter the compartment they keep low to minimise smoke exposure.

The five day course is similar to the two day course and includes in addition to more lectures a rubber fire and a Shell Oil (OM 17) fire where the use of aqueous foam forming extinguisher is demonstrated.

Flow Volume Measurements

Eighteen instructors were studied at the fire school (mean age 26·4 years range 19–38). The subjects performed maximum forced expirations into an Ohio 840 dry spirometer (frequency response flat within 10% to 15 Hz resolution — 1 ml volume 5 ml/sec flow). The spirometer was connected to a Morgan Spiro Date Base micro processor. The spirometer calibration for volume was checked by injecting known volumes of air using a 2 litre syringe. Flow is obtained by electrical differentiation of the volume signal.

The subjects performed the test seated and breathed through a special assembly of taps and valves to permit inspiration of either ambient air or a 20% 80% oxyhelium mixture from a 50 litre Douglas bag followed immediately by a forced expiration into the spirometer (fig. 4). The operator turned a single tap to connect the subject to the spirometer at the appropriate moment.

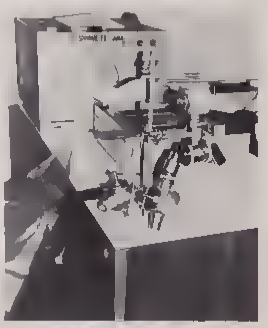

Fig. 4. [illegible] Ohio 840 [illegible] recorder [illegible]

Subjects were [illegible] smoke for one hour before their tests which were conducted as follows. Two forced expirations were first performed, each preceded by a single maximal inspiration through the tap assembly but without proceeding to residual volume. These were termed the "practice blows" (nos. 1 & 2) and were used to determine the forced expired volume in one second (FEV_1) but not the forced vital capacity (FVC). They

may also serve to open up the airways prior to the next three maximal expirations (nos 3, 4 & 5) which were continued until the subject could expel no more air from his lungs. These were each preceded by two maximal but relaxed inspirations and expirations from functional residual capacity. A nose clip was worn for all blows and a 30 second pause allowed between each blow. Since motivation and effort can be expected to vary between subjects the following instructions and encouragement were given:

This is a test to see how much air you can blow out of your lungs and how fast you can do it. It involves you taking some really deep breaths and then blowing the air out as hard and as fast as you can. Now fill your lungs right up (for the first time ... second time ... third time) ... now BLAST the air out AND KEEP BLOWING ... get every drop of air out ... etc. The same operator conducted all the tests.

Data from all five expirations was used to determine the FEV_1 (the mean of the three highest values within 0·2L of each other being taken). Blows nos. 3, 4 and 5 were used to determine the FVC, peak flow rate (PFR), forced mid expiratory flow (FMF) and flows at 25%, 50% and 75% of FVC (the mean of the values from the two blows with the highest FVC within 0·2 litre being taken for each). The two practice blows were not used to determine these parameters, only the FEV_1. In cases where blows 3, 4 and 5 presented a choice between two or more identical values for FVC, the blows with the highest flows were used.

After the five air breathing maximal expirations the subjects repeated blows 3, 4 and 5 but breathing 20% 80% oxyhelium for the three maximal inspirations.

Values for all the pulmonary function variables were printed out (corrected to BTPS) by the microprocessor for each blow, together with the values predicted for the subject's height and age based on the equations given by Cotes[9]. The oxyhelium/air ratio for the flow at 50% FVC ($\dot{V}$50% FVC H/A) was calculated using the mean air and oxyhelium flows.

Carbon Monoxide Transfer Factor Test

The carbon monoxide transfer factor (TL) test was carried out after the flow volume measurements. The single breath method was employed using Morgan Model C Transfer Test equipment and the transfer factor was adjusted for effective alveolar volume (Kco). Subjects were seated and wore a nose clip. After expiring to RV, they inspired a volume of test gas mixture equal to 20% less than their FVC (determined in the previous test) were instructed to hold their breath for 10 seconds then exhale. If a subject had difficulty in breathing in this volume (a buzzer starts when the set inspired volume is reached to indicate the start of the breath hold time) the set inspired volume was reduced to 30% less than the subject's FVC. The gas mixture contained 18% oxygen, 14% helium and 0·278% carbon monoxide (balance nitrogen). Samples of the inspired and expired (post dead space sample) gas were analysed for He, O_2 and CO and the transfer factor calculated.

Respiratory Symptoms, Smoke Exposure and Anthropometry

Each subject was given a respiratory symptom questionnaire (Medical Research Council 1976) with an additional section to take account of previous occupations in dusty jobs. The instructors are given annual chest X rays. The height and weight of each man was measured. A log was kept of the daily duties of each instructor by a member of the fire school staff. Efforts were made to test each instructor before he went out to the fireground, i.e. before any smoke exposure but since the tests on each subject lasted 30 minutes and we had to perform

the study with the least possible disruption to the daily schedule of the school this was not always feasible. The tests were carried out in a room set aside for the purpose in the fireschool administrative block away from the fireground

Experimental Design

The maximal expiratory manoeuvres and transfer test were carried out on a Friday and a Monday and on the following Friday and Monday in order to assess any effects of a week's work in the smoke and of two weekends away from the smoke. A period of two weeks annual leave then ensued so the subjects were retested on the Monday and Friday after their return to work (fig 5). Subjects acted as their own controls since differences for each man were assessed.

Statistical Analysis

The changes in the values measured for each subject over the course of the week, weekends and leave period were assessed for statistical significance by Wilcoxon's Rank Sum Test for paired samples. This test is preferable to the Student's *t* test for a small sample since it does not assume a normal distribution of values. A two tailed test was used throughout and unless otherwise stated significance levels are quoted at up to 5%.

Testing for Effects of a Single Wood Smoke Exposure

Sixteen trainees were tested. The purpose of the study was briefly explained to the class of trainees each day before their lectures in firefighting and two subjects selected if no volunteers were forthcoming. The two subjects were asked to refrain from smoking for three hours before their tests. The subjects' height and weight were recorded.

For this study a caravan was set up on the fireground next to the unit in which the wood fire exercises took place. The spirometry equipment was set up in the van as for the instructor study and trainees were tested immediately before and immediately after exposure to the smoke. The transfer test was not carried out on the trainees. The maximal expiratory manoeuvres were performed exactly as for the instructors breathing air and helium. The subjects were asked to return to the caravan as soon as they had extinguished the fire but were requested not to run. A respiratory symptom questionnaire was completed for each subject during the lunch break. All the tests were carried out by the same operator.

Results

No overall changes in pulmonary function were detected in the trainees as a result of exposure to a single wood fire (Table 1). As the primary purpose of the study was to look at instructors these results are presented in more detail as follows.

1 *Effect of first weekend away from the fireground*

Not every instructor was on the fireground every weekday, a rota system being in operation. In the week leading up to the first day of testing (first Friday) a

Fig 5 *Plan of study to show periods over which pulmonary function was assessed. Tests were conducted on each of the days indicated by boxes.*

TABLE 1 – CHANGES IN PULMONARY FUNCTION VARIABLES OF 16 TRAINEES ON PASSING THROUGH A SINGLE WEEK'S [illegible]

Name	FEV_1	FVC	$\frac{FEV_1}{FVC}$	PIR	PMF	V̇50/FVC	V̇50/FVC	V̇50/MFA	V̇50/FVC
A	+0 40	+0 48		−0 70	–	−0 80	−0 86	−0 56	−0
B	+0 11	+0 12	+0 72	−0 20	+0 45	−0 45	2 45	−0 11	0 5
C		0		0 15	+0 10	−0 30	0 95	0 1	0 8
D	+0 17	−0 14	+1 53	+0 05	+0 57	+0 15	0 50	−0 13	0 0
E		1 7		−0 35		−0 61	0 17	0 01	0 4
F	−0 05	+0 18	2 34	+0 10	−0 11	−0 30	−0 05	−0 08	−0
G	−0 54	−0 1	+0 98		2 91		1 95		0
H	−0 10	+0 10	−0 80	−0 55	+0 90	−0 66	1 54	−0 4	
I	−0 08	+0 08	2 28	−0 35	−0 41	−0 08	0 50	−0	
J	−0 15	+0 07	1 69	−0 05	−0 16	0	0 0	−0 0	−0
K	0 10	+0 20	+0 22	+0 30	−0 66	+0 30	−0 80	0 16	−0 9
L	+0 02	0	+0 85	−0 20	−0 06	+0 45	0 15	–	0
M		0 21		2 25		3 15	0 10	0	5
N		+0 07		2 44		2 36	−0 35	−0 03	−0
O	–	+0 20	–	+0 06		−0 35	−0 85		
P	–	+0 40		0 06		−0 31	−0 51	0 11	0
Mean	0 03	−0 01	−0 27	−0 02	−0 05	−0 14	−0 18	−0 04	−0
n	9	14	9	15	11	15	16	11	6
SE	0 23	0 38	4 01	1 02	1 10	1 14	1 36	0 23	
†significance	n s	n s	n s	n s	n s	n s	n s	n s	s

* *non smoker*
on subject tested in pm after diesel fire in am with breathing apparatus
† *Wilcoxon's Rank Sum Test for paired samples*

total of 14 instructors had been involved in teaching trainees over periods ranging from 2-4 whole days. Nine of these had also been at risk of smoke inhalation on the firegronnd shortly before their test since this took place in the late morning or early afternoon after they had already given some instruction in firefighting.

Twelve of the 14 smoke exposed subjects were tested on both the first Friday and the first Monday. There was no significant difference between any of the measurements made on these two occasions (Table 2).

2 *Effect of a working week on the fireground*

Twelve of the subjects spent from 2-4 whole days of the ensning week working on the firegronnd and were present for testing on both the Monday and Friday of the week. On the Monday three of the 15 had already been in the smoke prior to testing and on the Friday four had done so.

There were no significant differences between Monday and Friday values for any of the parameters measured (Table 3). Of the two non smoke exposed subjects one showed a slight increase in all flow/volume indices over the week and the other showed a slight decrease. The former worked in the administrative block well away from the firegronnd while the latter worked in the breathing apparatns room on the firegronnd.

3 *Effect of second weekend away from fireground*

Twelve instructors tested on the Friday and Monday of the second weekend of the study had been exposed to smoke during the preceding week. There were no statistically significant changes over the weekend (Table 4).

4 *Effect of a period of 12 days leave*

The Tuesday following the second weekend was the last day of training prior to a 12 day period of annnal leave. Tests were conducted on the Monday they returned to work at the school (in two cases on the following day). No tralning took place nntil

TABLE I — MEAN SUMMARY FUNCTION VARIABLES OF 11 INSTRUCTORS OVER FIRST WEEKEND

Name	ICA	FF_{1}	FVC	$\frac{FEV_{1}}{FVC}$	PFR	MMF	V25% FVC	V50% FVC	V50% M/A	V75% FVC
1	[illegible]	[illegible]	-0 01	+5 11	-0 25	+1 26	-[illegible] 85	+1 85	-0 25	+1 15
1	[illegible]	-[illegible]	-0 08	-0 80	0	-[illegible] 81	-[illegible] 01	-[illegible] 45	+0 38	-0 15
1	[illegible]	[illegible]	-0 15	-1 09	-0 60	-[illegible] 51	-[illegible] 10	-[illegible] 35	+0 31	-0 45
4	[illegible]	[illegible]	-0 03	+0 88	-[illegible] 15	-[illegible] 80	-[illegible] 15	-[illegible] 15	+0 13	+0 10
5	[illegible]	[illegible]	-0 02	1 88	+0 10	+0 60	+0 05	-0 10	+0 06	+0 05
1	+0 [illegible]	+0 [illegible]	-0 15	-0 18	+0 30	+0 12	+0 15	-0 15	-0 15	-0 15
10	+[illegible] 61	[illegible] 09	+0 13	1 11	-[illegible] 20	+0 18	+0 85	+0 15	+0 11	+0 15
11	+0-[illegible] 5	-0 05	-0 19	+1 11	1 10	+0 01	-0 35	+0-[illegible] 50	-0 29	+0 30
11	-0 1	[illegible]10	+0 05	+0 81	-0 10	+0 44	-0 20	+0 55	0	0
1-	+[illegible] 5	[illegible] 0	+0 05	-0 10	-[illegible] 15	-0 16	+1 15	-0 30	+0 08	+0 30
5	-0 [illegible] 8	-[illegible] 01	+0 05	1 16	-1 85	-[illegible] 30	+1 35	+0 10	-0 20	+0 20
1	0 56	-[illegible] 1	-0 15	-0 89	-0 55	-[illegible] 16	-[illegible] 15	-0 85	-0 11	-0 10
mean	+0 22	0 0[illegible]	+0 081	-0 19	-0 19	-0 01	-0 11	+0 001	-0 05	+0 08
—	11	11	2	12	11	11	11	11	11	11
U	0 38	0 11	0 14	1 95	0 68	0 56	0 11	0 81	0 15	0 81
1[illegible]gnificance	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Monday – minus Friday differences for 12 instructors who had been involved in training for 1–4 whole days in the preceding week (i e excluding day 5 f tests)

† *Wilcoxon = Rank Sum Test for paired samples*

TABLE 1 – *CHANGES IN PULMONARY FUNCTION VARIABLES OF 12 INSTRUCTORS OVER THE COURSE OF A WORKING WEEK (2–4 whole days training excluding day 5 f test)*

Names	ICO	FFV_{1}	FVC	$\frac{FEV_{1}}{FVC}$	PFR	MMF	V25% FVC	850% FVC	V50% M/A	V75% FVC
1	-0 17	-0 05	+0 25	0 88	-0 30	-0 11	-0 25	+0 10	+0 17	-0 60
1	-	-0 05	+0 11	+1 57	-0 30	+0 87	-0 20	+0 10	-0 38	+0 25
3		-0 05	+0 06	-0 29	-0 20	+0 84	-0 15	-0 10	-0 08	+0 15
4		+0 01	-0 02	0	-0 10	+0 06	+0 05	-0 15	+0 08	+0 10
5	-0 18	-0 10	0	-1 8	-0 44	-0 42	-0 60	-0 50	+0 11	-0 10
9	-0 01	+0 08	+0 01	+0 07	-0 15	-0 13	-0 55	-0 10	0	+0 10
10		-0 15	-0 13	-0 10	-0 40	-0 18	-0 60	-0 40	-0 37	-0 10
11		+0 10	+0 11	+1 58	0 85	+0 88	+0 90	+1 35	-0 08	-0 65
1	+0 01	-0 20	0	1 81	1 15	-0 18	1 20	-0 80	+0 01	0
[illegible]	-0 25	-0 11	-0 [illegible]5	2 27	-0 70	+1 21	-0 60	-0 65	-0 38	-0 60
6	+0 08	-0 09	-0 10	1 11	+2 15	+0 16	+1 6	+0 45	-0 20	+0 60
1	-0 06	+0 11	+0 11	+0 15	-0 15	-0 18	-0 55	-0 35	+0 60	-0 20
mean	-0 04	-0 03	+0 05	1 18	-0 09	+0 26	-0 01	-0 12	-0 01	-0 01
—	1	12	11	12	11	11	12	11	12	12
U	0 18	0 11	0 11	1 12	0 81	1 01	1 18	0 57	0 11	0 09
†[illegible]gnificance	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

† *Wilcoxon's Rank Sum Test for paired samples*

* *non-smoker*

1 *INSTRUCTORS NOT INVOLVED IN TRAINING ON FIVECROSS*

12	-0 31	+0 11	-0 15	+1 51	+0 15	-0 51	+0 10	+0 50	+0 06	+0 85
6	-	0 07	0	-1 11	-0 85	-0 58	-1 60	-0 35	-0 05	-0 20

TABLE 8 *CHANGES IN PULMONARY FUNCTION VARIABLES OF 12 INSTRUCTORS OVER SECOND WEEKEND*

Name	KCO	FEV_1	FVC	$\frac{FEV_1}{FVC}$	PFR	PMF	V11% FVC	V50% FVC	V50% RA	V11% FVC
1		−0·39	−0·28	−3·38	−0·85	−0·79	−0·11	−1·21	−0·06	+0·11
3		+0·11	+0·17	+0·11	−0·11	−0·51	+0·20	+0·11	−0·01	+0·11
4		+0·31	−0·08	+1·08	P	−0·20	+0·01	+0·11	−0·10	+0·01
5		+0·28	+0·11	+1·10	+0·25	−0·30	+0·15	+0·43	+0·08	−0·20
* 8		−0·06	0	−0·09	−0·10	−0·10	−0·01	+0·09	−0·11	
* 9		+0·11	−0·20	+0·01	−0·35	1·10	+0·01	+0·11	−0·11	+0·30
10		−0·01	−0·05	+0·10	−0·15	−0·01	−0·1	−0·10	+0·08	+0·05
11		+0·01	+0·11	−1·10	+1·00	−0·08	+0·01	−1·11	+0·11	−0·11
13		−0·02	−0·17	+2·38	−0·10	+0·10	−0·01	−0·41	+0·10	−0·15
14		+0·06	−0	+1·00	−0·11	1·01	1·11	0	−0·11	+0·02
11		+0·01	+0·11	−0·10	0·11	0·06	−0·10	+0·11	−0·01	−0·15
*10		−0·11	0·02	−0·17	−0·40	−0·14	−0·15	−0·25	0·10	−0·0
mean		+0·01	−0·01	+0·01	−0·17	−0·08	+0·10	−0·09	+0·01	−0·04
n		12	11	12	11	11	11	11	11	11
SD*		0·11	0·14	1·11	0·11	1·11	0·01	0·19	0·13	0·18
†signif. at n		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.

† Wilcoxon a *Rank Sum Test for paired samples*
n non smoker

2 INSTRUCTORS NOT INVOLVED IN TRAINING OR FIREFIGHTING

11		−0·22	−0·11	0·00	1·30	−0·67	1·40	−0·50	+0·01	−0·10
8		+0·11	+0·11	+0·11	+0·11	+0·20	+0·110	n.s.	0	0

TABLE 1 – *CHANGES IN PULMONARY FUNCTION VARIABLES OF 13 INSTRUCTORS OVER A PERIOD OF TWO WEEKS LEAVE*

Name	KCO	FEV_1	FVC	$\frac{FEV_1}{FVC}$	PFR	PMF	V25% FVC	V50% FVC	V50% RA	V11% FVC
1	−0·40	−0·04	−0·11	+1·10	−1·11	−0·10	1·60	+0·01	−0·10	−0·11
3	−1·01	−0·05	+0·10	−2·51	+0·25	−0·15	−0·20	1·00	−0·11	−0·10
8	−0·17	0	+0·01	−0·36	−0·20	−0·06	−0·41	+0·05	−0·05	−0·60
* 8	−0·50	−0·11	−0·25	+0·12	−0·40	−0·25	−0·45	+0·15	−0·14	+0·11
7	+0·13	+0·10	+0·15	+1·80	−0·20	−0·55	−0·41	−0·61	−0·09	+1·13
* 9	−0·5*	+0·02	+0·12	1·91	+0·15	−0·04	−0·20	−0·30	−0·08	−0·01
10	−0·19	+0·02	+0·12	1·01	0	−0·08	0	+0·20	−0·06	−0·11
11	−0·35	+0·05	+0·10	−0·11	+0·11	0	−0·20	+0·20	+0·05	−0·11
10	−0·61	0	−0·05	+1·00	+0·11	+0·01	+0·04	0	−0·01	+0·01
11	−0·11	−0·11	−0·10	−0·00	−0·00	−0·00	+0·50	−0·30	+0·11	−0·20
14	−0·11	0	−0·10	+1·11	−1·20	−0·15	−1·01	−0·01	−0·01	−0·20
11	−0·01	−0·05	+0·01	−0·10	−0·10	−0·01	−0·15	+0·01	−0·01	−0·10
*10		+0·21	+0·20	+2·10	+1·10	+0·04	+1·15	−0·90	−0·11	+0·70
mean	−0·10	+0·02	+0·001	−0·28	−0·06	−0·005	−0·001	+0·03	−0·01	−0·04
n	11	11	11	13	11	11	11	11	11	11
SD*	0·28	n.14	0·11	1·05	0·05	0·41	0·71	0·50	0·11	0·00
†significance p<0·01	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.

† Wilcoxon's *Rank Sum Test for paired samples*
* *non-smoker*

2 INSTRUCTORS NOT INVOLVED IN TRAINING OR FIREFIGHTING

12	+0·11	+0·07	+0·10	−0·11	+1·30	+0·09	+1·01	+0·11	−0·04	+0·11
8	+0·01	+0·01	+0·20	+2·00	−0·01	+0·22	+0·20	+0·11	+0·01	n

TABLE 6 — CHANGES IN PULMONARY FUNCTION VARIABLES OF 12 INSTRUCTORS OVER FIRST WEEK AT WORK AFTER TWO WEEKS LEAVE

Name	KCO	FEV_1	FVC	$\frac{FEV_1}{FVC}$	$\dot{V}_{25}$	$\dot{V}_{50}$	$\frac{\dot{V}_{25}}{FVC}$	$\frac{\dot{V}_{50}}{FVC}$	$\frac{\dot{V}_{75}}{FVC}$	
1	+0 28	0	−0 05	≡0 00	≡1 00	+0 02	+1 28	−0 25	−0 28	−0 01
3	−0 15	−0 04	−0 13	+6 37	0	−0 68	0	+1 10	−6 28	+0 70
4	+0 08	≡0 03	−0 15	≡2 69	≡0 45	+0 68	+0 15	≡0 75	−0 01	−0 28
* 6	−0 01	−0 05	−0 29	≡3 12	+0 25	−0 11	≡0 60	−0 35	−0 01	−0 05
* 9	−0 29	−0 16	−0 03	2 15	+0 45	−0 03	+0 20	1 60	−0 10	≡0 60
10	≡0 16	−0 45	−0 60	1 84	−0 65	−0 05	−0 55	−0 75	−0 04	−0 40
11	+0 63	−0 05	−0 11	≡2 61	0 50	+0 60	+0 55	≡0 60	−0 16	0 26 *
14	≡0 74	−0 09	−0 05	+0 26	0	−0 12	−0 05	−0 10	−0 04	≡0 15 *
15	+0 60	−0 10	−0 38	≡3 56	−0 48	−0 05	≡0 10	−0 05	≡0 06	≡0 10 *
16	−0 08	−0 24	−0 35	≡2 25	−0 50	≡0 09	−0 85	−0 85	−0 07	1 08 *
17	−0 53	−0 26	−0 60	+6 32	−0 30	−0 08	+0 15	−0 05	−0 02	−0 10 *
*18	−0 28	−0 12	−0 50	≡5 93	−0 50	−0 05	−0 45	+0 10	0	+0 05
mean	−0 04	−0 09	−0 14	+1 8	+0 09	+0 19	−0 11	−0 03	+0 07	0 33
	12	12	11		12		11	12	11	
σ	0 44	0 16	0 21	2 45	0 50	0 42	0 52	0 63	0 16	0 4
†Wilcoxon significance	0	p<0 10	p<0 01	p<0 01	n s	n s	n s	n s	n s	p<0 05

*Wilcoxon's Rank Sum Test for paired samples
*non smoker

* Involved in training on 1 day of the week.Remainder on duty on fireground but not instructing trainees

2 INSTRUCTORS NOT ON DUTY ON FIREGROUND

1	−0 52	−0 13	−0 43	+4 66	≡1 10	≡0 66	−0 65	+0 08	−0 01	−0 10
8	−0 34	−0 11	−0 32	+2 70	−0 05	−0 16	−0 15	−0 30	−0 01	−0 50

the Wednesday of that week

Three subjects had difficulty in inspiring the set volume for their transfer test These were the volumes that they had inspired without difficulty in the pre leave tests A higher frequency of cough was also noticed amongst the subjects than before the leave period

The data of 13 subjects was assessed for changes in lung function over the leave period (Table 5) There were no statistically significant changes in any of the flow volume indices but a highly significant ($p < 0.01$) fall in Kco mean fall = 0 5 ml CO/mm/mm/L alveolar volume (SD±0 38) The pre-leave Kco values used for this analysis were those of the first Monday of the study since no values were available for the second Monday and several were not available for the second Friday This was considered justifiable since it has been shown that Kco did not significantly change over the pre-leave period of the study

5 *Effect of first week at work after leave*

Twelve subjects performed the tests on the Monday and Friday of this week but only five of them were involved in training and for one day only The remainder were on duty on the fireground but not in the units This number of smoke exposed subjects was too small to test statistically for significance but inspection of their data (Table 5) revealed a fall in FVC in four of the five (mean fall 0 37 L range 0 13 0 60) The fifth subject showed an increase of 0 05 L Three of the five showed a fall in FEV_1 (mean fall 0 2L range 0 1 0 26) while the other two showed increases of 0 05 L and 0 09 L As a result of these changes the FEV_1/FVC ratios for all five subjects increased (mean increase 2 47% range 0 76-4 37) $\dot{V}$75% FVC increased in all five subjects (mean increase 0 47 L/S range 0 1 1 0) There appeared to be no directional trend in the changes in the other variables for the five subjects

In summary there was no significant decrement in pulmonary function of smoke exposed trainees or instructors detected by

the methods used There was no change over the course of a normal working week at the fireschool nor over two weekends Over a period of two weeks leave K_{CO} fell significantly but no overall change was observed in flow volume indices Over the course of the first week at work after leave a significant decrease was found in FEV_1 and FVC and a significant increase in the FEV_1/FVC ratio and in V75% FVC These changes were *not* confined to those subjects who had been working in the fire units during the week

Discussion

The present study of trainee firefighters passing through a single wood fire showed no significant overall change in flow volume indices

Experimental subjects exposed to a high concentration of inert particles such as coal dust[9] showed only slight transitory changes in FEV_1 whereas the effects of firefighting in the study of Musk *et al*[4] sometimes lasted for several hours The latter authors suggest that the alterations in pulmonary function were more than reflex responses to heavy loadings of particulate matter and that local pharmacological activity of the gases or particulates in the smoke may account for some of the changes This is known to occur on exposure to cotton dust [10] It has been suggested that some usually harmless building materials such as wood may release pulmonary irritants depending on the conditions of their combustion [11 12 13]

It is possible that our trainees were tested after a transient reflex effect had worn off and before a more prolonged pharmacological effect had become established It is probably more likely that a single short exposure to wood smoke whilst keeping low to minimise smoke inhalation does not result in significant decrement in pulmonary function

It is also possible that exercise played some part in the results The wood fire training was moderately physically demanding and several subjects showed some degree of hyperpnoea on arrival for the post fire tests Had the schedule at the fireschool permitted a 'dummy run' through the wood fire exercise before the pre fire tests but without a fire might have been appropriate It would also have been interesting to retest the subjects after a recovery period especially those few in which the flow-volume indices did change markedly on passing through the fire

Smith *et al*[14] studying changes in forced expiratory flow rates due to air pollution from fireworks concluded that while susceptible people were measurably affected the general population of the polluted area probably experienced little if any adverse effect

There is thus no evidence from the trainee study that exposure of young healthy subjects to a single wood fire in a confined space and without breathing apparatus results in decrement in pulmonary function in the majority

The long term effects of firefighting on the lungs have been investigated in large numbers of subjects by several workers The effects have not however been clarified and changes due to smoke inhalation may often be obscured by the effects of tobacco smoking Tashkin *et al*[15] carried out pulmonary function tests on 21 Los Angeles firemen one month after exposure to combustion products of polyvinyl chloride which had produced transient hypoxaemia in 19 of the subjects They concluded that although fighting fires may result in acute pulmonary injury secondary to discrete episodes of smoke inhalation it does not appear to predispose to the development of chronic respiratory symptoms or chronic functional impairment Mastromatteo[16] reported a decreased risk of lung disease in an examination of mortality data in Toronto firemen

Sidor and Peters[11] studied prevalence rates of chronic non specific respiratory disease in 1 768 Boston firefighters and found a higher incidence amongst experienced firefighters than amongst new recruits of the same age group although cigarette smoking partially obscured the occupational effect Selection factors (i e those subjects who are adversely affected by smoke often seek jobs elsewhere) can also result in underestimation of disease rates in longitudinal studies of firefighters

When the 89 subjects of a preliminary study in the Glasgow firefighter investigation[6] were separated into two groups of those with 0-10 years service and those with 11 27 years service it was found that the smoking habits of the two groups were identical and that there were also nearly identical results for vital capacity total lung capacity and diffusing capacity Tests for airways obstruction (the FEV_1/FVC ratio) showed the group means to be well above normal but the long service group showed a greater tendency towards airways obstruction

The results of pulmonary function testing in the Boston firefighters suggested that those subjects with more adverse exposure actually had a larger FEV_1– FVC and FEV_1/FVC ratio and were therefore apparently healthier

These problems highlight the necessity of studying the same individuals over a period of time– during which they experience a known profile of smoke exposure Ideally an unexposed matched population should also be studied over the same period

Peters *et al* [2] studied 1 430 of the Boston firefighters a year after the initial testing and found decrements in FEV_1 and FVC of more than twice that expected from aging and which were significantly related to frequency of fire exposure 1 146 of the subjects were again studied four years after the original testing[2] but the annual decline over the last three years was found to be less than that observed over the first year and could not be related to the number of fires fought or to other indices of acute fire exposure Selection factors were again thought to be important in protecting firefighters from continued loss of ventilatory capacity The authors report higher decrements in those subjects who had not fought fires in the intervening years and point out that the men fighting the fewest fires smoked the most cigarettes

The finding in the Royal Naval instructors of a significant fall in Kco over the two weeks leave was possibly a reflection of an increased cigarette consumption whilst not at work (smoking not officially being permitted on the fireground itself) although a comparable fall in Kco was seen also in the two non smokers for whom data was available The lowered Kco was however maintained during the first week at work after leave The fact that most of the instructors were not involved in training duties during this week and probably maintained a high cigarette consumption may be relevant The mean fall in the transfer factor itself over the leave period was 3 15 ml/mm Hg/min Had Kco not been determined this fall might have been attributed to a change in effective alveolar volume but since Kco also fell this cannot be the case The possible role of cigarette smoking in these changes raises the question of whether it is justifiable to ignore the carbon monoxide back tension in assessing the effects of smoke exposure on pulmonary diffusing capacity

The fall in FEV_1 seen in most of the instructors over the course of the first week at work after leave would have suggested some degree of airways obstruction had the FVC remained unchanged However the highly significant fall in FVC suggesting some sort of restrictive constraint on ventilation is probably the cause of the reduced FEV_1 The observation that maximum expiratory flow at low lung

volumes and the ratio of flows at 50% FVC breathing oxybelium and breathing air did not significantly change over any of the periods studied suggests that the group as a whole showed no evidence of small airways obstruction

The apparent improvement in flow at 75% FVC over the first week at work after leave is difficult to interpret as is the decrease in FVC It is interesting that sufferers from byssinosis a unique pattern of respiratory insufficiency caused by inhalation of the dust of cotton flax and certain types of hemp first experience symptoms of tightness in the chest on Mondays after a weekend away from the dust or on other days after returning from holiday[8] Partial or complete recovery usually occurs during the night Our subjects did not show a significant increase in FVC over the weekends or their leave period so that a response of this nature is not likely It would have been interesting if time had permitted a follow-up of the subjects over the second week after their return to work

Any further attempts to define the cause of the observed changes would become somewhat speculative and it must be concluded that the study provides no evidence that over a period of four weeks pulmonary function is significantly altered as a result of firefighting as conducted at the Royal Naval Firefighting School However we feel the real value of Phase I is to serve as a scientifically sound basis for follow up investigations on a long term basis Phase II will attempt to determine the long term effects on pulmonary function of a relatively well defined and regular smoke exposure If significant decrements are observed the study will obviously be useful as a guideline to initiate procedural and/or equipment modifications to make the working conditions of Royal Navy firefighting instructors safer On the basis of the study to date any suggestions for such modifications would be premature

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Thermal Stress and the Contribution of Radiant Heat*

D J. Smith

ABSTRACT

Sixteen young healthy volunteers were exposed to eight thermally severe environments each subject being exposed to four different climates Four climates had a radiant heat component globe temperature some 10°C above dry bulb In the other four climates the globe temperature was close to the dry bulb Measurements of endurance time in the different climates were made as were changes in body temperature and heart rate The relationship between the wet bulb globe thermometer index (WBGT) and stay times in the non-radiant climates agreed well with that of previous workers Further the WBGT index appeared adequate in the situation under study in terms of its ability to quantify climatic severity thermal and cardiovascular stress and hence endurance in climates with a high radiant heat component

Introduction

Whilst man's thermoregulatory ability enables him to maintain his body temperature close to 37°C environments may be found so thermally severe as to preclude homeothermy for an indefinite period of time Under such conditions exposures must be limited to safe levels in order to prevent heat casualties.

In order that the likely effects of a given climate on personnel may be assessed it is necessary to measure the four thermometric variables comprising that climate and to integrate them into a single index figure which may then be used to compare one environment with another and so make predictions based upon experimental and field experience.

Many methods have been suggested and all have been used only two however are currently employed by the Royal Navy The first is the Effective Temperature (ET) described by Yaglogiou and Houghten[1] This index requires for its derivation measurements of the dry bulb aspirated wet bulb and air movement In environments with a radiant heat component the globe temperature needs to be taken into consideration and Vernon and Warner[2] recommended that the globe temperature should be used in place of the dry bulb and the derived value termed the Corrected Effective Temperature (CET) The disadvantages of the ET and CET scales are that nomograms are required direct measurements of air movement are needed they are unreliable at high temperatures and inappropriate for use in environments with a radiant heat homeothermy Additionally the CET contains an error in the value for humidity and Yaglou[3] proposed a correction to the wet bulb to give an index which is known as the effective temperature including radiation (ETR) A simpler index which correlates well with the ET and CET[4] is the Wet Bulb Globe Thermometer Index (WBGT) first described by Yaglou and Minard[5] It is now generally recorded automatically on a meter which calculates the index as 0 7 Wet bulb + 0 1 Dry bulb + 0.2 Globe temperature One great

*Based on a paper given at a meeting on Physiology and the Royal Navy held at the Royal Society of Medicine (United Services Section) on December 6 1979

[illegible] through its effects on the globe and wet bulb temperatures

From a military point of view environments of importance are those which could cause casualties through heat illness namely a band of conditions where heat stress reaches critical levels It is for such conditions that the WBGT is appropriate and in practice has proved of great value in reducing heat casualties in army training operations particularly in the open desert conditions for which it was intended

As stated earlier conditions may exist where thermal equilibrium cannot be maintained Safe exposure times must therefore be determined and if possible related to a temperature index A series of studies to determine the mean time for subjects to reach a state of imminent heat collapse in a wide range of climates was carried out by Bell Crowder and Walters[6] in the 1960s Their findings enabled predictions to be made of tolerance times for fit personnel wearing standard engine room clothing and working at a rate of 310 watts (equivalent to walking at about 3½ miles per hour) Similar experiments have been carried out in our laboratory using the same work rate and similar clothing The main difference between our studies and those of Bell Crowder and Walters[6] was that stay times were calculated as the time for a subject's deep body temperature (T_{DB}) to reach 39 5°C his heart rate to reach 180 beats per minute or the subject to request that he be allowed to leave the chamber Analysis of the data revealed that the best correlation between our results and those of Bell Crowder and Walters[6] was obtained when our stay times were calculated on the basis of a T_{DB} of 39 5°C by extrapolation where necessary[7] Figure 1 shows the comparison of their data with ours From their analysis of 440 observations a general

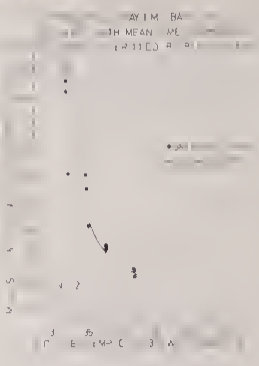

Fig 1

equation expressing a rectangular hyperbolic relationship between imminent heat collapse times and environmental severity described in terms of 0 2266 Dry bulb + 0 7734 Wet bulb in °C was derived The points are values for stay times based on a T_{DB} of 39 5°C obtained in one of our studies Despite the small number of observations there is close agreement between our results and those of Bell Crowder and Walters[6]

The outstanding question is whether we can use the relationship obtained by Bell Crowder and Walters[6] to determine stay times in environments with a radiant heat component using the WBGT Index When an index has proved so valuable in one context there is a great temptation to apply it in others The WBGT was originally intended as a substitute for Yaglou's scale of ETR and restricted to the case of soldiers in the open In the remainder of this paper a series of experiments is described which were designed to answer the question in an attempt to validate or otherwise the use of

the WBGT on board ships where the radiant heat load may be high but where the source temperature is relatively low i e non-solar

Methods

Two teams of eight university students were used as subjects each subject was exposed to four different climates eight climates were used in all Four of these had a significant radiant heat component produced by banks of infra red heaters mounted at 70 120 and 190 cm above floor level The subjects were positioned 180 cm from this radiant heat source The other climates were similar in respect of dry and wet-bulb temperatures but no radiant heat was added The range of temperatures used gave WBGT indices between 36 and 43°C In the radiant climates the globe temperature was some 10°C higher than the dry bulb Air flow was maintained at 50 cm per second

Before exposure subjects were weighed nude thermistors and ECG electrodes were attached to the skin for the measurement of mean skin temperature and heart rate Deep body temperature was monitored from a thermistor mounted in the external auditory meatus Subjects were dressed in Royal Naval overalls over bathing suits When equilibration of the thermistors was complete the subjects entered the chamber and commenced exercise This consisted of stepping on and off a box 22 9 cm (9 in) high at a rate of 12 complete steps per minute

During the experiment T_{DB} was measured every two minutes and skin temperature every six minutes Exposures were terminated for any of the following reasons subject request a deep body temperature of 39 5°C a heart rate of 180 beats per minute or irregular On removal from the chamber the subjects were towelled down and reweighed for the calculation of sweat rates

Results

Mean metabolic rate from Douglas bag measurements made during the exposure were found to be 300 ± 10 (SD) watts for both radiant and non-radiant environments the same as that obtained by Bell Crowder and Walters[6]

Endurance times based on the limits chosen inevitably depend upon the rates of rise of T_{DB} and heart rate These are shown in figs 2 and 3 plotted against the WBGT Index These two figures strongly suggest that the thermal and circulatory stress imposed by climates with a radiant component are well described by the WBGT Index Thus we would predict that stay times in radiant and non radiant climates would fall on the same line This is borne out by the plot of actual stay time against

Fig 2

Fig 3

Fig 4

Fig 5

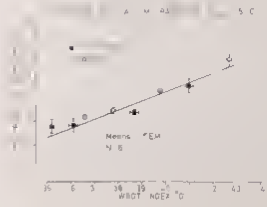

Fig 6

WBGT Index presented in fig 4 It is possible though unlikely that the thermal stress in the radiant climates was greater than would be predicted from this relationship further stay times based on T_{Dg} 39·5°C correlated better with mean time to imminent collapse as determined by Bell Crowder and Walters[6] Therefore stay times based on this limit were calculated and presented in fig 5 Again a similar hyperbolic relationship is obtained with both sets of points appearing to fall on the same curve

As rates of rise of heart rate and T_{Dg} bore a linear relationship to the WBGT Index it would be expected that reciprocal transformation of stay times would also produce a linear relationship This is shown in fig 6 The regression line has been drawn through these points All points fall close to or on this line further supporting the proposal that the severity of environments with a radiant heat component are adequately quantified by the WBGT Index

Discussion

Figs 7 and 8 summarise the value of this study to the services The Royal Navy uses the WBGT Index routinely in a wide variety of environments in order to recommend safe exposure times and duration of work in such climates- these times are determined from the relationship between temperature and mean time to imminent collapse obtained by Bell Crowder and Walters[6] shown as the solid line in fig 7 This graph shows clearly that a wet/dry index will considerably overestimate endurance times in an environment with a radiant heat component

The main question to be answered is whether by replacement of the wet/dry index by the WBGT Index Bell s relationship will adequately predict stay times in climates with a radiant heat component generated from a relatively low

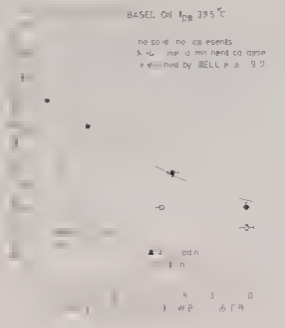

Fig 7

Fig 8

temperature source Fig 8 compares our data with that of Bell Crowder and Walters[6] The wet/dry index has been replaced by the WBGT Index and the values obtained in our study have been replotted The solid line represents Bell's relationship as before Although stay times in the radiant climates tend to fall to the left of the line and those in the non radiant climates to the right, the actual divergence is so slight (less than 5 mins) as to be of little practical importance

Conclusions

From these experiments we believe we have shown that in a thermally severe climate where the radiant temperature is some 10°C above the air temperature the WBGT Index is a good predictor of thermal stress and in this type of environment use of the WBGT meter is likely to be of value in the prediction of safe endurance times and its use does not need to be restricted to open situations Its applicability in climates or environments with much higher radiant heat loads from a non-solar source has not been proved Further study is required in this area

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A Case of Penetrating Head Injury in an Infant

M A Farquharson-Roberts

ABSTRACT

A case of penetrating head injury in a six month old child is described in the context of the facilities available in Malta at the time. The management is briefly discussed

Introduction

Following The withdrawal by British and other NATO forces from Malta in 1971 a new agreement the Military Facilities Agreement (MFA) was negotiated between Her Majesty s Government and the Malta Government This allowed the return of British forces and use of Base facilities until March 31 1979

As part of the rundown of the British presence the Royal Naval Hospital M'tarfa closed on January 31 1978, and on the same day RNH Luqa came into being This was within RAF Luqa and was housed in what had been the RAF Regional Medical Centre It opened as a thirty bed hospital with surgical medical and gynaecological (but not obstetric) clinical departments The theatre was an Octatent that had done previous sterling service at both the home RN hospitals The staff of 45 officers nursing officers ratings and naval nurses were responsible initially for the hospital care of 7 000 servicemen their families and UK based civilians although numbers were rapidly decreasing with the rundown Locally enlisted personnel were also entitled to treatment

Case Report

B S the six month old younger child of an LRO was admitted as an emergency at 1800 on August 24 1978 He had been sitting on the floor at home when he had fallen to his right on to the upturned axle of a large LEGO type wheel (fig 1) This had penetrated his temple According to his mother who witnessed the accident he had not at any time lost consciousness or fitted

Fig 1 *Lego type wheel On the right is the wheel actually removed*

On admission he was fully conscious alert and very lively Fig 2 (posed at follow up) shows the position of the wheel and this comprised the only abnormality on examination X rays (figs 3 and 4) show the axle to have penetrated both tables of the skull The films are of poor quality as the patient was trying to adjust the tube!

He was started on prophylactic phenobarbitone and later the same evening taken to theatre Under general anaesthetic the scalp was shaved the head prepped

Fig 1 *Post injury* [illegible] *holding the wheel in the position* [illegible] *admission*

and towelled The wheel was removed from the axle using bone nibblers (fig 1) A skin flap (shown healed fig 5) was formed and lifted over the axle A burr hole was then placed close to the axle and developed with bone nibblers until the inner end of the axle could be seen It was then apparent that the dura mater was tented inwards by a depressed spike of bone about 0 5 cm long This remained depressed when the axle was removed under direct vision The bone spike was therefore removed and the wound closed in layers with drainage

The patient s post operative recovery was uneventful and he was discharged four days later to outpatient follow up

His phenobarbitone was stopped two months later At his final review 4½ months later, just prior to his family leaving Malta he was walking and was a normal healthy child He had had no fits An X ray showed the craniotomy to have closed

Discussion

John Woodall Master in Chirurgery discussing the treatment of head injuries in his book The Surgeon s Mate published in 1617 chiefly for the benefit of young Sea Surgeons' remarks that the first intention in curing of wounds is to take away whatsoever is besides natures as Iron wood leade or ought else with fit instruments to take away the hair or

Figs 3 & 4 *Skull* [illegible] *movement reflect*

Fig 5 *[illegible] the scar [illegible] the puncture [illegible] from site*

what else might seem to hinder the good application of medicines is the first part

These injunctions remain true today but Mr Woodall had no knowledge of the causes of post traumatic epilepsy, such as the spike of bone described Removed such a penetrating object must be but under direct vision so that the dura and if necessary the brain can be inspected, dead tissue removed vessels ligated dura repaired and potential causes of post traumatic epilepsy removed [1 2]

This case also illustrates that unlike closed head injuries unconsciousness is less commonly a feature Indeed quite severe penetrating head injuries may be associated with a normal level of consciousness on presentation

The other essential in treatment is phenobarbitone It appears that a patient who fits in the period after head injury and its immediate surgical management is most at risk from post traumatic epilepsy [3] It is well recognised that phenobarbitone decreases the incidence of such fits Whether it therefore decreases the incidence of post traumatic epilepsy is a matter for conjecture (indeed it seems difficult to devise an ethical and valid clinical trial!) but if it only decreases post operative fitting it is invaluable.

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Dupuytren's Disease of the Foot

P H Gibson

ABSTRACT

Based on a series of eight cases the incidence of Dupuytren's disease of the foot is discussed and treatment by excision and primary skin graft is described.

Introduction

Dupuytren's disease of the foot is reported to be uncommon and to be generally asymptomatic [1,2] Plantar lesions do not produce the deformities and contractures which are common in Dupuytren's disease of the palm

In a five year period at the Royal Naval Hospital Haslar 62 cases of Dupuytren's contracture were treated surgically and of these eight cases had plantar involvement (12%) In two cases the lesions were found in patients with Dupuytren's disease of the hand and in neither case did the plantar lesions give rise to symptoms or require treatment

The other six cases had isolated plantar lesions and no other stigmata of Dupuytren's disease These are presented to illustrate the typical appearance and behaviour of Dupuytren's disease of the foot and to allow comment on treatment

Case Reports

Case 1 A 21 year old man presented with a tender 2 cm nodule on the medial border of the right foot which had been present for three months There was no family history of Dupuytren's contracture or other evidence of Dupuytren's disease The nodule and a margin of plantar fascia were excised through a transverse incision Histology confirmed plantar fibromatosis There was no evidence of recurrence one year after excision

Case 2 First presented at 20 with a nodule on the sole of the left foot 1 5 cm in diameter The nodule was in the middle of the medial arch and was tender and painful on walking It had been noted for six months following the removal of a plaster applied for treatment of a fracture dislocation of the ankle The nodule was excised with a margin of healthy tissue Histology confirmed plantar fibromatosis There was no evidence of recurrence nine months post operatively

Case 3 A 20 year old soldier presented with a nodule on the medial border of the plantar fascia just proximal to the metatarsal head The nodule had been present since the age of 14 and had only become painful on beginning Army training The nodule with overlying skin and a 3 cm margin of plantar fascia was excised and the area was skin grafted with a thick split skin graft Histology confirmed plantar fibromatosis There was no recurrence at nine months

Case 4 This 26 year old presented with a nodule on the sole of his left foot This was excised with a margin of healthy tissue and overlying skin and a split skin graft applied Histology confirmed plantar fibromatosis There was no recurrence six months after operation

Case 5 first presented at 18 years with a

nodule on the sole of his right foot which was excised There were recurrences in the same area two and five years after operation which warranted further excision Ten years after the first operation a 2 cm diameter nodule required excision He had no other evidence of Dupuytren s disease and there was no positive family history of this Histology confirmed plantar fibromatosis

Case 6 presented at 26 years with a 1 cm nodule on the medial border of the right foot which had been present for four months The nodule was painful on pressure and on walking on an uneven surface He had no other evidence of Dupuytren s disease and no relevant family history A year later the nodule although clinically unchanged was still giving rise to symptoms Excision of an area of plantar apo neurosis 1 cm x 3 cm was performed with suture of the skin Microscopy confirmed plantar fibromatosis

After two months it was noted that there was a ring of induration in the area of the previous incision Three months later there was thickening of the margin of the previous contracture which was increasingly tender and surgery was advised. At operation six months after the original excision the recurrence and a 3 cm margin of normal plantar fascia and skin was excised A split skin graft was applied to the defect Histology confirmed plantar fibromatosis with no evidence of mitotic or neoplastic activity The patient made an uneventful recovery but the grafted area remained tender for over a year after the second operation Two years later there was no evidence of recurrence or of Dupuytren s disease of the hands

Discussion

The occurrence of Dupuytren s disease of the foot has been known since the original description of palmar disease [3] Anderson [4] in 1891 described a single case of plantar fibromatosis associated with Dupuytren s contracture of the hand

The involvement of the sole of the foot occurs in a singularly regular pattern which is typified by the cases described (fig 1) A nodule appears on the medial border of the plantar aponeurosis at or just distal to its mid point in a much younger age group than in palmar disease

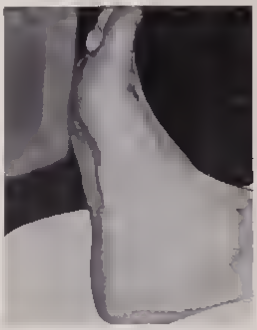

Fig 1 The typical position and appearance of a plantar nodule

It has been said that the nodule is symptomatic only because of its size [5] However in the cases described tenderness of the nodule has been an important feature This may result from the high degree of activity which is expected of a young servicemen Few patients with Dupuytren s contracture of the hand manifest ectopic deposits [2] The incidence of plantar involvement varies from series to series Pickren *et al* [6] reviewed 104 cases from the literature and added a further 16 cases of their own Lund [7] described one case in 1,021 brewery workers but also describes 25 cases in 365 epileptics (8%) Earley [8] describes a 6 9 per cent incidence of plantar fibromatosis in male patients

with Dupuytren's contracture but the incidence increased to 16·9 per cent in epileptics Gordon[1] describes nine cases in 101 patients with Dupuytren's contracture but in only one of these was there plantar involvement alone

In this series there are eight plantar cases out of 62 patients operated on for Dupuytren's disease and in six of these there was only plantar involvement The high proportion is probably related to the low age group under treatment in a naval hospital It is important to emphasise the fact that the plantar lesions often appear independently of the typical palmar lesions and may not in fact be recognised as Dupuytren's disease

Histology

The nodules of plantar fibromatosis are highly cellular consisting of mature fibroblasts and fibrocytes arranged in a more or less concentric pattern The cells are surrounded by mature collagen and reticulin fibres and show few mitoses The nodules are not encapsulated and the interdigitation of the cell groups with the fascia and extension outside of it may give the impression of infiltrative growth This may lead to the mistaken diagnosis of fibrosarcoma Amputation for recurrence of the plantar lesions has been reported [5]

Treatment

Local excision of plantar nodules has been reported to be commonly followed by recurrence [6 7 5] This recurrence may be rapid and has led to the erroneous diagnosis of fibrosarcoma The incidence of recurrence is such that it has led some authors to advise treatment by excision of the entire plantar fascia [2 8 9]

The treatment of recurrent Dupuytren's contracture of the hand by excision of the contracture and overlying skin with replacement by skin graft has been reported by Heuston[10] to prevent further recurrence in the area grafted

This treatment has been adopted in the management of plantar fibromatosis in three of the cases presented In two cases this was used as a primary procedure and in the third as a secondary procedure following recurrence (fig. 2) This case has been followed for three years without recurrence

Fig. 2 *Hyperaemia following wide excision and skin graft*

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Preliminary Information to Medical Officers on their Input to the Attitude Survey

A R Marsh

The Dean of Naval Medicine thought that medical officers would like to be informed of the results of the attitude survey as soon as possible since they have willingly provided the basic information for it

The RN Medical Officers Attitude Survey was set up last year by the Institute of Naval Medicine at the request of Surgeon Vice Admiral Sir John Rawlins in conjunction with the Senior Psychologist (Navy) A questionnaire was prepared with the objective of answering questions of particular interest where recruitment and retention of medical officers were concerned Why do doctors join? Why do the majority leave on completion of SCC and only a minority elect to stay in the Service? What is the importance of postgraduate training? And perhaps of most relevance what changes are needed to make careers in naval medicine more attractive and satisfying? SP(N)'s department has carried out an initial analysis of the data from the questionnaire and this report is based on the preliminary findings The Institute of Naval Medicine was involved in formulating some of the questions and its objectives but the analysis so far has been carried out by SP(N)'s department.

Overall there was an almost 80 per cent response to the questionnaire and only nine of 270 medical officers who replied chose to remain anonymous The information is presented broadly under the headings of the questions asked in the questionnaire sent to all medical officers

Influences on Joining

Medical officers joined the RN because they wanted to practise medicine in a congenial environment with opportunities for travel sport and social activities It appeared that by joining the navy individuals were able to defer making definite career decisions Negative influences on joining included doubts about opportunities to specialise and about how much actual chance there would be to travel It is of interest that less than 10 per cent of Surgeon Sub-Lieutenants intended making a full career in the Service Apparently the Service attracts people who have no intention of continuing in service at the time of joining and the conclusion was drawn that the RN is attractive to join and easy to leave

Relative Favourableness

Medical officers had been asked to compare aspects of life in the RN with those in civilian practice It was gratifying to find that 80 per cent were satisfied with life in the Service and that 75 per cent were professionally satisfied Most professional satisfaction was expressed by those involved in research staff work and hospital specialties and least by ship and

establishment medical officers Conversely ships' MOs were most satisfied with life in the RN and hospital doctors much less satisfied It was difficult however from the analysis to identify cohesive groups of opinion Medical officers are individualists — there were as many different attitudes as there were completed questionnaires!

Satisfaction of Four Aspects

The questionnaire had asked medical officers to express their satisfaction or otherwise with communication the appointing system career planning and promotion Senior officers tended to be most satisfied but communication was pinpointed as an area of dissatisfaction by Surgeon Lieutenant Commanders/ Lieutenants almost 50 per cent of whom were unhappy with this aspect

Leaving Intentions

Medical officers intention to extend their service increases with the length of time served General duties medical officers were more intent on leaving at the end of their present commissions than were hospital specialists Professional considerations were the main reasons given but others included disruption of family life and the need to embark on a second career before one was too old Over 50 per cent of Surgeon Captains and Surgeon Commanders whether on MCC or FCC were keen on the option of professional service to 60 years

What should be the Concerns of Top Management?

This question indicated that top management should be concerned about better communications and most medical officers considered that career structure guarantees of further training and more manpower should have priority

Personnel Policies

Possible change in personnel policies were indicated but there were few positive pointers and the suggestions did not appear to touch on any deep felt needs A number of split responses were obtained a third thought that uniform was unnecessary, mainly junior officers and about a half were in favour of both additional pay for professional qualifications and merit awards No change was advocated in the length of commission and rather surprisingly there was no apparent demand for a specific specialist training commission It was suggested that the Branch should be better organised recruitment improved and that Service doctors should treat the family unit Thirteen per cent are in favour of tri Service integration

This information has been based on an analysis of the data according to rank and broad grouping of specialisation (General Duties Hospital and Occupational) carried out by SP(N) staff A number of areas have been uncovered which will be useful to management but it is considered that a more detailed analysis according to specialist areas and type of commission will give additional valuable information This further analysis is currently underway

The publication of detailed figures has deliberately been avoided in this report but these will be presented together with data from the further analysis at a later date in a formal further restricted report to be produced by INM

One conclusion that has been reached is that areas of concern to management are the losses of medical officers that occur on completion of SSC and MCC It has been decided that detailed group discussions of randomly selected officers will be arranged to explore attitudes further and to assess suggestions in greater depth with particular reference to the loss of medical officers The survey may be usefully

extended to explore the attitudes to the RN of non cadet medical students and also the attitudes of medical officers who have recently left the Service The advisability of these future studies is being considered by MDG(N) since additional limited funding will be required

Finally the Dean would like to thank all officers who have taken part in this survey for their thought and time in completing the questionnaire and hopes those selected will help to refine the information in the planned group discussions which will take place in INM during 1980

LETTER TO THE EDITOR

Sir

Vancouver format A retrograde step

I was concerned to read in the last issue (Winter 1979) that the Journal intends to adopt the Vancouver format for references in order to fall into line with some other medical journals

To the casual reader of scientific literature the insertion of numbers in the text may well be less distracting than quoting the names and year of publication of the original authors But for someone familiar with the literature in a particular field it is extremely frustrating and time consuming to be required to continually turn to the reference section whenever a number is quoted in the text If the names of the original authors are quoted in the text one immediately knows which papers are being referred to without interruption to one's flow of thought Readers who are not interested in the original source of information may easily gloss over the names in brackets without their concentration being affected

It would seem that the standard of scientific writing in some medical journals may be lowered by the adoption of the Vancouver format and the Journal of the Royal Naval Medical Service should not follow suit without due deliberation

I am Sir

Yours etc

F St C Golden

Surgeon Commander RN

Drilling in Brunei

A W Jones

The Sultanate of Brunei will cease to be a British Protectorate on January 1 1984, when it assumes full independence This small country with its 190 360 population[1] covers an area of 2.226 square miles The majority of the State is swamp and hilly lowland jungle It has one of the highest average per capita incomes in South East Asia This is due to an economy based on fossilised fuels. Brunei has vast reserves of energy in the form of crude oil and natural gas under her territorial waters Shell Petroleum and the Brunei Government have shares in the Brunei Shell Petroleum Co Ltd and additionally with Mitsubishi in the production transportation and sale of LNG (Liquid Natural Gas) to Japan

Dentistry within the Sultanate is governed by three agencies — the Government Health Department the Askar Melayu Di Raja Brunei i e the Army and Brunei Shell Petroleum Co Ltd The government employs six dentists and has 23 dental nurses in various schools after the New Zealand pattern The Army has two dentists on loan service from the Royal Army Dental Corps Shell employs my Chinese colleague and myself

Our hospital at Panaga is responsible for the medical cover of approximately 20 000 persons employees and dependants of BSP and its supporting contractors The dental department fulfils a dual role — that of the conventional general dental practitioner and a hospital type service To deal with the latter first the full general anaesthetic cover and operating facilities enable us to do all our own routine oral surgery and having no referral service we often have to deal with acute trauma resulting from road traffic or rig accidents Figure 1 gives an idea of the type of problem encountered

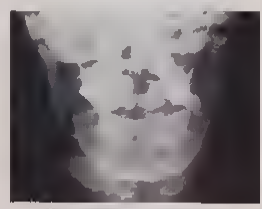

Fig 1 *Bilateral fracture of mandible*

Within the department all facets of dentistry are covered. The small dental laboratory staffed by two Chinese technicians produces excellent acrylic and removable appliance work chrome cobalt prostheses however are fabricated in Singapore Porcelain bonded crowns are produced by the senior technician as a result of his attending a ceramic course in his native Singapore.

Prevention is mainly in the hands of the hygienist Like the rest of the staff she is Chinese She started as a dental nurse 14 years ago but has been trained by successive dentists to her present role She has been

the full-time hygienist since 1974 Prophylaxis with an ultrasonic scaler is accompanied by oral hygiene instruction She also provides topical fluoride gel application and latterly after instruction from myself has been applying Delton* fissure sealant to suitable co-operative patients

The main departmental problem is the ever increasing demand for dentistry which is already difficult due to the high dentist patient ratio This is coupled with the task of balancing the huge range of dental experience that is encountered The gulf when handling an American or European patient accustomed to a private sector and that of the local labour force whose only experience has been limited to extraction is vast The Company employs 28 different nationalities ex patriates who are predominantly English or Dutch regional staff from the neighbouring ASEAN nations of Malaysia Singapore and the Philippines and mainly the locally recruited Chinese residents and Brunei Malay citizens It is the small minority groups that give us the most communication problems My staff can cover the Malay language and seven Chinese dialects but dependants of Italian divers or Korean welders not to mention the odd Portugese or Omani do require a special thespian form of communication!

Anthropologically the local staff are mongoloid and exhibit many of the well documented dental features of that group Shovel shaped incisors are very common [2]

Unfortunately the deep cingulum pit is a frequent nidus for caries The oriental or Leong premolar now classified as dens envaginatus [3] is occasionally seen in the surgery Caution has to be exercised during extraction of lower first permanent molars as many are trifurcate (fig 2) Tratman [4] established an occurrence of 9 5 per cent for the Chinese race and 16 08 per cent for

Fig 2 *Trifurcate lower first permanent molar*

Malays in his survey conducted in Singapore The author obtained a 14 6 per cent occurrence in Brunei Malays in his survey which is to be published in the Singapore Dental Journal Prognathism is also fairly common amongst the Malay population My current survey will ascertain whether there is an increased incidence of torus palatinus or torus mandibularis in either Chinese or Malay patients An initial small sample of 200 has revealed an incidence of torus palatinus of just under 50 per cent This contrasts with the 20 6 per cent obtained by Kolas *et al* [5] for Caucasians and Negroes

In neighbouring Sabah and Sarawak indigenous tribes not present in Brunei used to practise tooth mutilation This has been well documented by Laband [6] and Peacock [7] but unfortunately I have seen no signs of this practice However other forms of tooth decoration do exist The gold anterior crown is common These are manufactured by the local shop toothsmiths" In Brunei and neighbouring East Malaysia they are classified as Class B dentists They perform a service by relief of pain and provision of acrylic dentures reducing the workloads on dental clinics The gold anterior crown is swaged over the

* *Delton — Johnson & Johnson Ltd*

tooth surface after the barest minimum of preparation The heart (fig 3) is the most popular window shape but a friend claims to have seen a heart club diamond spade combination across the four incisors! Unfortunately the clinical crown is often completely carious beneath its gold veneer

Another local practice is betel-nut chewing Areca nut is wrapped in sirih leaf which has been smeared with lime and the red paste of gambier The result is heavily stained teeth and brown tongues

The high personal incomes mean that large quantities of refined carbohydrates are consumed especially by children The results are appalling as the rampant caries and multiple abscesses of the illustrated three year old depict (fig 4)

Brunei Shell having an independent supply does add fluoride to its water It is added at the level of 0·7 ppm which is suggested for tropical climates where there is an increased fluid intake [8]

The oil industry does not produce many possible dental hazards other than trauma resulting from accidents involving heavy machinery However the department does venture into four spheres of industrial health The teeth of workers in the battery shops are monitored for the effects of acid vapour Similarly we examine the teeth and supporting tissues of those employees who handle the highly toxic tetra-ethyl lead when it is added to petroleum in the refinery A third group of at risk patients are the visiting crewmen of the oil and gas tankers They take advantage of their cargo loading times for the treatment of dental emergencies Fourthly we arrange special cover for the divers from the Sub Sea Oil Services Compulsory dental fitness is not made obligatory by their company but many take advantage of the system

My Service connections have not been completely severed I used to liaise with the Flotilla of the AMDB They have several RN officers on loan service at their base 70

Fig 3 *Swaged gold anterior crown with heart*

Fig 4 *Rampant caries in Malaysian kid*

miles away in Muara I was able to drive one of the Vosper (Singapore) constructed fast patrol boats at 35 knots Unfortunately this working association ended when the Flotilla changed from a Moslem working week i e Saturday working following a Friday sabbath to a conventional working week Now due to identical working hours social events only are possible Two splendid Tralalgar nights can be vouched for

My main Service connection is with the Brunei Garrison stationed in Seria Currently it is the 10th Princess Mary's Own Gurkha Rifles A permanent RAMC medical officer is attached to the battalion but dental cover is only provided at intervals by 10th Dental Group Hong Kong During the interim periods Panaga Hospital dental department acts as their emergency cover

This gives us many opportunities to meet the Gurkhas and their families I have a profound affection for these tough witty people from Nepal shared I am sure by others fortunate enough to have had dealings with them

As 10th Dental Group Hong Kong is a joint Service post we have had two appearances of the tropical whites of the RN Dental Branch from *HMS Tamar*

The liaison with the Army has enabled me to bivouac in the jungle with the men of the 7th Duke of Edinburgh s Gurkha Rifles attend demonstrations of jungle warfare and handle a selection of weapons on the ranges

I hope this article conveys a little of the varied life and dentistry found in Brunei Darus Salaam — Abode of Peace

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Activity of the Medical Profession on the Occasion of a Disaster at Sea. The Tragedy of the Sinking of the Andrea Doria witnessed by the Ship's Doctor.*

B. Tortori-Donati
(Translated from the Italian)

Introduction

My reasons for deciding to relate my experiences as ship's doctor during the sinking of the Italian liner *Andrea Doria* following a collision are partly scientific and partly human.

They are scientific because, as far as I am aware, the only ship's doctor to describe the sinking of the ship which he was on board was Dr. Savigny (the sinking of the *Medusa* in 1816) and therefore relating my experience is certainly an uncommon chapter in naval medicine. They are humanitarian because the ship's doctor on board a sinking ship naturally concentrates on himself and becomes the depository of the manifold experiences and sensations of a community of people reacting in extremely different ways in the face of grave danger.

Furthermore, at medical congresses and meetings with various colleagues who are experts in naval medicine I have been asked on several occasions to write an article for medical reviews recounting my experience at the time of one of the greatest sea tragedies of all time. Consequently, I thought it right that the knowledge I had acquired should be published so that people would know of it, reflect on it and make a critical evaluation with the aim of deriving useful knowledge from it.

Why have I waited so many years before setting about writing this article? At the beginning everything concerning the sinking of the *Andrea Doria* was the subject of an inquiry both in Italy and in the United States and consequently it was at those sessions that everything regarding the sea disaster was reported. Subsequently the episode became an actual, much debated topic of journalism with a succession of articles and the publication of a book with a widespread circulation. I thought it appropriate to wait until the wave of emotion aroused by the event had passed so that the still vivid memories and accurate notes which I had made during the heat of the moment could be reviewed critically and form the basis for an analysis allowing me to pursue my established aim, namely, reporting on an extremely rare professional experience which would be instructive for those who, by misfortune, might find themselves in a similar tragic situation.

Professional Activity following the Collision

First of all, a preliminary statement must be made. During an ocean crossing, the figure of the ship's doctor becomes very well known among the travelling community. It is therefore easy to imagine that once the collision had occurred and the ship had suddenly and frighteningly listed, the ship's

*I first met Professor Tortori-Donati at the meetings of the European Nautical Medical Officers, who are, as can, might guess, largely ex-Naval medical officers and practical experienced doctors, dedicated to the service of seafarers whether Naval or Merchant Marine in background.

The Andrea Doria was rammed and sunk by the Swedish liner Stockholm off the Nantucket Shoals at 2300 on July 25, 1956. We are grateful to the author and to the Head of Ispettorato di Sanità della Marina Militare, Rome, for permission to publish this account, which first appeared in the Rivista Annuale di Medicina Navale, Genoa, March 1979, LXXXIV, Fasc. I.

Ed.

doctors were confronted with nnmerons pressing requests for assistance These were difficult to sort ont with regard to priority and the help that should be given and created a considerable hindrance in carrying out professional activity making the work unavoidably chaotic and exhausting without a moment's pause or time for recovery This series of repeated operations consisted of administering medicines applying dressings and medications giving injections preventing possible tranma dnring rescue operations searching for separated relatives providing moral comfort for people seized by panic giving material assistance in evacuating the ship and many other activities aimed at meeting the needs of a large nnmber of people who snddenly found themselves in a grave emergency situation

These activities clearly of lesser importance in relation to the events which will snbsequently be referred to and impossible to describe according to their sequence in time kept the two ship's doctors and nnrsing staff continnonsly and nrgently occupied as may easily be imagined given that there were 1706 people on board (1134 passeogers and 572 crew members) I shonld mention first of all that in settiug ont the assistance given to the passengers I shall refer to the part played by the ship s medical department since I have personal knowledge of this role Howevar all the ship's services and personnel were kept fnlly occupied Only in this way was it possible to carry ont fully the complex rescue operation

The collision between the *Andrea Doria* and the Swedish vessel *Stockholm* occnrred on Jnly 25 1956 at abont 2300 honrs and immediately the Italian liner listed heavily to starboard Thick white acrid smoke filled the first class vestibule where the two ship's doctors were Thinking that an explosion had occnrred in the engine room the doctors made their way as laid down in the instructions on emergencies on board to the ship s hospital to care for the patients brought there and to make the necessary arrangements to cope with the emergency Two female American passengers were in the women s hospital C Rosa aged 71 who had carcinoma of the larynx aod decompensating cardiopathy, and O Mary aged 65 who had a fractured left femnr in the consolidation phase The room boy B Gaetano was in the men's hospital he had a dental abscess diffuse stomatitis and was in a very feverish state

Leaving my colleague in the sick bay with the nnrsing staff to cope with the expected requests for assistance I went np to the upper decks to find ont what had happened When the londspeakers gave the order for everyooe to go to the assembly point for abandonning ship I retnrned to the hospital to evacnate the sick Together with the head female nnrse I helped to carry the first sick woman whilst two male nurses saw to the removal of the fractnre case The room boy had however made his own way ont The transport proved very laborious and awkward because of the distance to be covered (three floors) and the listing of the ship which was gradnally worsening Furthermore the first patient, whose general condition was serions snffered two attacks of acnte cardio circnlatory failure which made us fear exitus When we finally reached the promenade deck the assembly point for abandoning ship I entrusted the patients to the care of two female nnrses to await arrival of the lifeboats Meanwhile I noticed that in the first class cabin on the npper deck No 58 there were two injured female passengers imprisoned by the cabin s strnctnres and fearfully disturbed by the collision with the other ship I entered this cabin with the head nnrse and found the access corridor free whereas the living qnarters were a mess of strnctnres bulkheads and furnishings out of which came female voices begging

for help As any attempt at manual removal proved impossible partly because of the risk of causing even greater injury to the trapped women I sent the nurse to the hospital for the amputation saw and small plaster cutting saw and asked for an axe as the most suitable instrument for trying to free the two women In the meantime I attempted to get into the cabin through No 56 next door When I opened the door the access corridor seemed to be restricted to a small portion the remainder being obstructed by a tangle of furniture and intersecting structures Through this tangle I could hear the sound of the sea Amidst all these structures a lifeless human body was stretched out I established that death had occurred

Meanwhile my help was requested in two tourist class cabins on B deck where three women passengers were on the point of drowning in the diesel oil which had flooded that sector Filled with terror they were howling to be saved as they could not manage to get out on their own So I left the nurse in cabin 58 at the disposal of the husband (a qualified doctor) of one of the imprisoned injured women and with a courageous and willing crew member who was engaged in an unselfish attempt by his own strength to rescue the two unfortunate women

Together with my colleague who meanwhile had responded to a request for help in the cabin class and two male nurses I went to B deck which was flooded by the diesel oil from the tanks crushed at the time of the collision and made strenuous efforts to reserve the passengers in danger of drowning Having taken the three women to the first class assembly point we were told that one of the two women trapped in cabin 58 had been removed with great difficulty Along with my colleague I went to the cabin and found the woman laid carefully in the access corridor on a cover I verified that there was a fracture to the left lower limb and also a suspected fracture of the upper limb With help we carried the injured woman to the first class assembly point where we set up a corner for the sick and shocked In the meantime the patient with the decompensating cardiopathy had had an attack of acute pulmonary oedema and I had to proceed with the necessary treatment just managing to save her

It was not easy to get a lifeboat to come and take the invalids on board since we were exactly at a point level with the split in the side of the *Andrea Doria* caused by the prow of the colliding ship When two or three lifeboats finally came alongside there was a very worrying rush of passengers all wanting to get into them My colleague and I managed to calm them making them understand that it was necessary first of all to transfer the sick and shocked to the boats The transfer of the passengers rescued from the diesel oil caused the floor to become smeared so that the other passengers fell repeatedly with resultant trauma I therefore asked everyone to sit on the floor and allow themselves to slide to the embarkation point

With the help of my colleague and two male nurses I personally saw that the two sick women were put in the boat whilst the brave crew member who had removed the trapped woman from the damaged cabin saw to it that she was transferred to the boat with assistance from other passengers Having evacuated the sick we learned that the attempt to rescue the other woman trapped in cabin 58 had been abandoned since as verified by her doctor husband she had died

At this point about 0430 on July 26 the large-scale operation to evacuate those on board the *Andrea Doria* could be said to be practically at an end Only crew members remained on board I therefore sent my colleague on board the *Ile de France* which luckily had come to our help at about 0200 hours because as a doctor he would

certainly lent great assistance to our colleagues on the French liner in their enormous task of treating the numerous sick people and cases of shock which had been taken there However remained as doctor for the remaining crew members on the *Andrea Doria* and to carry out my task whatever it might be in completing the rescue operations As a matter of fact I had to give medical attention and assistance to the remaining 28 sailors including the Master in the last boat to leave the ship this continued to float alongside the liner now listing even more heavily on her damaged side while we awaited the arrival of the ocean going tugs which had been requested in a desperate attempt to save the Italian ship by running her aground This medical assistance also continued on the US torpedo boat destroyer *Edward H Allen* eventually reached by Italian sailors in two of the *Andrea Doria's* other boats and who were not picked up by the rescuing ships

As I mentioned the collision between the two liners occurred at about 2300 on July 25 1956 There were 1706 people on board the *Andrea Doria* At 0430 on July 26 ie 5½ hours after the collision only a few crew members and the Master remained on board awaiting the arrival of the ocean going tugs

In the disaster 43 people on the Italian ship died They had occupied the cabins destroyed at the time of the collision with the Swedish ship In addition as mentioned one woman passenger (P Mary) died during the attempt to remove her from the ruined structures of her cabin Furthermore two other passengers died following evacuation a Mr W Carl from a myocardial infarction and a small girl (D S Norma) whose father gripped by panic had taken her from the hands of a sailor who intended to transfer her to a lifeboat and had thrown her directly at the boat itself The little girl was not caught by the rescuers and hit her head on the side of the boat sustaining a fractured skull She died in the Boston Hospital where she was taken by helicopter from the *Stockholm* Lastly after some months another female passenger died following a fractured spine sustained when getting into the lifeboat

On the *Stockholm* four crew members occupying cabins at the bow died bringing the loss of human life as a result of this disaster to 51 The Swedish sailors who died sustained exceptionally serious injuries at the time of the tremendous impact with the Italian ship

Comments

Thus I have reported the activity of the doctors and nurses on board the *Andrea Doria* during what has been described as the greatest sea rescue operation of all time I have also referred to the impossibility of describing thoroughly all the work of assistance which the ship's medical unit carried out on such an intensive scale during the 5½ hours when evacuation was taking place

Initially there was surprise and shock as a result of the sudden occurrence and panic due to uncertainty as to how events would develop then rescue operations had to be organised and at the end these were going at a dizzy and decisive rate following the arrival of the liner *Ile de France* with all her equipment and capacity to receive the people taken off the *Andrea Doria*

When the collision occurred it was impossible to launch the *Andrea Doria's* portside lifeboats owing to the considerable initial listing and the small number of boats sent by those ships which reached the disaster area (*Cape Ann Private William H Thomas* apart from the *Stockholm* which of course remained at the scene) made evacuation slow and tricky Furthermore the broad split in the starboard side of the *Andrea Doria* caused by the tremendous impact deterred the first rescuers from approaching that area with rescue equipment resulting in a long wait

before boats came near enough to pick up the people gathered there including the sick and shock cases On the other hand the evacuation assumed a quick uninterrupted rate with the arrival of the *Ile de France* (about 0200 on July 26) and for all practical purposes the rescue was complete in a little over two hours

Considering the number of people on board at the moment of collision (1706) and the number of survivors (1659) it is noted that 2 37 per cent died in that great disaster This is the first important fact to be derived from a critical analysis of the occurrence This is of even greater importance if we consider that of the 47 who died, 43 lost their lives at the time of the collision and three died after being taken to safety In actual fact only one person could not be saved because she was firmly imprisoned amongst the cabin structures brought down by the collision

The percentage of people rescued should be emphasised because the evacuation operations were conducted under very precarious conditions of balance given the sudden and ever-worsening list of the ship and the extremely slippery conditions on board

The physical exertion required for this frenetic activity in difficult conditions of balance is borne out by the fact that once we had reached New York many crew members including myself suffered from cramp pains in the calves The Master actually had to be taken to the Presbyterian Hospital with thrombophlebitis in the left leg which prolonged his stay in the USA and mine as a result because I chose to remain with him until his return to Italy

There were also many cases of contusions sprains abrasions, burns conditions of cardio-circulatory lability from stress fatigue with fainting anxiety neurosis with vomiting and insistent cold shivering for which, following evacuation of the passengers the Italian crew members who remained on the ship until the last requested my assistance either while we were in the last three lifeboats or on the torpedo boat destroyer *Allen* in which we reached New York after the tragedy

I must mention the psychological situation which came about on the ship following the collision when all on board were suddenly confronted with an extraordinary event which perhaps they had never remotely imagined could take place This psychological unpreparedness had widely differing effects on their behaviour especially in the first moments after collision when rescue operations had to be undertaken using equipment which at first was inadequate for the purpose It must not be forgotten that owing to the serious listing of the *Andrea Doria* none of the lifeboats on the portside could be lowered This situation, and the resultant uncertainty as to the immediate future definitely contributed towards creating panic amongst the passengers When the first lifeboats came alongside the panic spread in waves everyone's irrational desire was to be saved immediately without thought for the order of priority which the ship's personnel were trying to impose This particular climate explains the irrational act of the father of the girl who subsequently died in Boston Hospital he threw his daughter directly at the lifeboat which had drawn alongside

The psychological situation considerably improved with the arrival of the *Ile de France* the large illuminated French liner gave everyone a well founded hope that the chance of rescue had been greatly increased

At the moments of greatest panic when in fact some people threw themselves into the water in a desperate attempt to escape from the ship which seemed about to sink at any moment it was interesting from a psychological point of view to note the attitude of the ship's personnel There was amongst them a different faculty for

exercising the prestige necessary to calm the passengers and impose some kind of order This prestige was directly proportional to the apparent composure of the person giving the orders and to the determination with which he demanded that they be carried out without ever deflecting from the priority of first of all getting the sick the injured and the women and children to safety Without a doubt this strictness definitely displeased quite a number of people because in every case of real emergency the egoistical evaluation innate in the human mind comes to the surface and consequently one's own case is judged to be the most important However I must mention the behaviour of a group of Canadian priests who whilst awaiting their turn calmly and with great dignity drew aside to pray and comfort the people nearby

In the uncertain conditions which dominate the scene of a rescue operation of such proportions torment is undoubtedly suffered by anyone who has to take a decision which may affect the outcome In this sense the situation of the two ship's doctors was particularly delicate because they had the ethical and moral obligation to act as doctors to all on board not as doctors treating individual cases They were both well known and easily distinguishable and it can well be imagined how in the emergency situation numerous requests for help all made at the same time were directed at them It must also be stressed that their activity had above all to be concerned with providing medical assistance and could not manifest itself as any activity for which crew members could be used All the same whenever a medical colleague was identified amongst the passengers the ship's doctors would delegate the care of individual cases to him so reserving their attention and energy for those situations where this fortuitous and valuable collaboration was not available It should moreover be emphasised that after some hours the gradual tilting of the ship and the absence of lights on the lower decks where the ship's hospital was situated made it extremely difficult to obtain fresh medical supplies to cope with the constant requests for medical assistance

During the rescue operations there were also many cases amongst the passengers of that polymorphous pathology already described in the crew members who were last to leave the ship In addition the slight undulating movement which caused the no longer steered ship to undergo pitching and/or rolling movements provoked numerous cases of sea sickness with vomiting among the passengers However the psychological stress following the collision and anxiety as to the outcome of the rescue operations certainly contributed to this state The fact that the collision occurred in the summer season even though at night when the ocean temperature in the area was mild and also that the period spent in the water by those who jumped overboard before rescue was short meant that there were no symptoms of hypothermia Such symptoms are frequent and very serious amongst victims of a sea disaster who fall into the water

I feel it is now necessary to go into an objective analysis of the behaviour of the *Andrea Doria*'s crew behaviour which since that time has given rise to various perplexities and about which much has been written either in praise or in denigration It is not possible to make an objective analysis unless we start from the indisputable fact that following the collision everyone on board was saved except of course those killed at the time of the tremendous impact between the two ships and the woman passenger (P Mary) who was imprisoned in the shattered structures of her cabin Certainly there were some amongst the 572 crew members of the *Andrea Doria* during

that last fatal ocean crossing particularly those whose professional qualifications were not strictly speaking those of seamen who gripped by panic abandoned ship in order to escape with the passengers From a human point of view this is understandable fear is an irrational unconscious and instinctive sensation which can overcome moral and behavioural characteristics

The collision between the two ships was certainly an unexpected and terrifying event The sudden listing of the *Andrea Doria* which rapidly worsened made everyone fear that the ship would sink within a short time Consequently the crew members who fled from the ship did not perhaps have time to take stock of their behaviour and make the critical analysis necessary to overcome their fear Furthermore in an emergency not all members of a ship s company have the same onerous tasks to fulfil- itself a factor of mental occupation and therefore have a less intense demand on them to provide the solutions necessary for carrying out their duties in full For example when I appeared as a witness before the Board of Inquiry my spontaneous and natural reply to the question whether or not I had been afraid was that I did not have time for fear my position on board ship imposed upon me a frantic activity which drove from my head all thoughts other than those of carrying out my duty as a doctor

However there is no doubt that the evacuation of the ship took place in a complete manner an obvious sign that the *Andrea Doria s* crew responded in an exemplary way to its task of getting everyone to safety Of course the duties which were the responsibility of those crew members who abandoned ship soon after the collision were carried out by those who remained thus increasing the efforts they had to make in the successful rescue attempt There were numerous incidents of true heroism and of conscious and therefore the more praiseworthy subordination of personal safety to the scrupulous performance of entrusted tasks in the desperate efforts to prevent the ship from sinking following the collision

It cannot be overlooked that the *Andrea Doria* went down without the slightest trace of any fire on board- (in spite of the lower decks being flooded with diesel oil) with the lights on the upper decks still on and with one bilge pump still operating This is tangible proof of the efforts made to save that fine disaster stricken ship The complete success of the rescue operations meant that those with tasks of great responsibility responded fully at the time of the emergency showing competence strength of character calmness, organising ability and initiative, and making it possible to carry out the huge scale operation in full

A source of encouragement and an example to us all was the figure of the Master the man with the tragic destiny extremely competent well liked and held in esteem by his crew with his detached gentlemanly features conforming to the accepted image of the typical passenger ship Master When the collision occurred he was faced with a very serious emergency and certainly the most strange and varied feelings must have crowded his mind in a stupefying whirl He managed to maintain an inner calm and control of the situation listening to everyone and giving precise orders aimed at the successful rescue of all on board and at saving the ship entrusted to his command In accordance with the most noble naval tradition he did not want to leave his ship- at that stage on the point of sinking and only consented to get into the lifeboat when he realised that his remaining crew members were firmly resolved to follow his fate if he did not get himself to safety On this occasion too he showed consideration understanding and affection towards the most faithful of his colleagues When he reached New York and was taken

to hospital with thrombophlebitis in his left leg, he maintained an attitude of great dignity taking a very humane interest in the other cases and without ever considering his own misfortune which for all practical purposes put an end to a prestigious career and a life completely devoted to the sea

Conclusions

As mentioned in the introduction literature on the subject is extremely scarce since marine disasters are only analysed by the Boards of Inquiry which investigate the ways in which they happen searching for the possible causes with the obvious aim of making improvements to ensure that they do not occur again

From the medical point of view thorough studies have been made of the effects upon human beings of immersion in water following the sinking of a ship the harm caused by hypothermia its prevention and cure the psychological aspect of survival at sea the calorie requirement and diet of people adrift the suitability of rescue equipment and the participation of medical personnel in the organisation of search and rescue operations following a marine disaster That is to say colleagues who have written on the subject have investigated the medical aspects of the effects on those involved in sea tragedies partly because not having been on board, they could not recount an experience that they had not been through nor could they report the most important aspects of the tragedy

On the other hand I wanted my contribution to be related to a real life experience involving the medical aspects of a high sea rescue operation as experienced by the ship s doctor who precisely because of his qualifications was able to gather together and analyse the details of a professional experience which was certainly original and which lacked a satisfactory bibliography despite the unfortunate repetition in time of these tragedies

In addition to the foreseeable repercussions on the physical soundness of the people involved in a marine disaster which manifest themselves in a many sided traumatic type of pathology or which aggravate in a resounding way pre-existing pathological conditions it is also necessary to consider the effect on the psyche of these people Consequently those in charge of ships undertaking ocean crossings should strictly enforce the rule that passengers attend the rescue exercises held at the beginning of each trip With thorough preparation at a practical level and with precise knowledge of what everyone should do in the event of an emergency, the surprise and psychological unpreparedness would be reduced in such a way that the rescue operations could be implemented in a calm and orderly fashion

Obviously it is difficult to hypothesise on a marine disaster partly because it may take on unusual aspects and not follow exactly the pattern of previous events However an objective situation is common to all disasters the psychological response of the human being to the unexpected and to a serious emergency It is precisely in coping with and trying to modify or at least attenuate the abnormal reactions of those involved that the ship s doctor s task becomes both demanding and delicate

The rest is reduced to a normal professional routine with an absolute predominance of first aid medical activity carried out in conditions of precarious equilibrium and with extremely reduced medical protection

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Struck by Lightning — The Effects upon the Men and the Ships of HM Navy

H. Cannell

Part 2.* 1762-1842 — Deaths, Destruction and Diatribe

Lord Anson's directive to the fleet in 1762[1] was that a lightning conductor made of wire should be fixed at the mainmast head and trailed into the sea during thunderstorms. Within a short time it appears that the wire was replaced in HM ships by a copper chain similarly fastened. Captain Cook[2] in his barque *Endeavour* recorded that his ship was protected from lightning by such a chain in October 1770 whilst a Dutch East Indianman, only two cables away and without such protection was struck and severely damaged. Cook then went on to state that in his opinion the Dutch ship had attracted the lightning to itself in the first place as it had a pendant spindle made of iron at the maintopmast head. This view that lightning was attracted to any metal shape on the top of masts was widely held at that time and Cook's remark may have become the source of much of the later controversy in the Navy regarding the use of metal spindles and wind-vanes. Blunted metal ends[3] to masts were often used despite this shape also seeming to attract lightning strikes. Yet the Dutch persisted in the decoration of their mastheads and to this day often have rounded finial shapes made of metal there.

In 1780 the French Academy of Science invited Benjamin Franklin, the inventor of the lightning conductor, to advise them. His ideas led to much discussion and in 1784 a Mr. Le Roi developed the principle to be of use to French Naval ships.[4] Indeed Le Roi claimed that he was responsible for the invention of the first permanent form of lightning conductor on any ship. The first vessel he fitted with his development was the *Etoile*, an armed storeship of 700 tons destined for America. The usual lightning rod terminating in a point was fixed to the masthead. From this a copper chain was led down along the mainmast stays and then fixed to a line of copper plates nailed to the hull and continued to below water level. The French adopted Le Roi's idea and soon his less than robust but permanently fixed conductors were fitted into many of their ships. These included frigates and other war ships as well as ships on world voyages such as the *Boussole* and the *Astrolabe*.

Meanwhile the Royal Navy persevered with their fragile and unwieldy copper chain. This notwithstanding orders was often left packed in a box rather than led from the masthead to the sea when a thunderstorm threatened. The result was that many accidents occurred and men continued to be lost during thunderstorms. Yet so large was the British fleet and so far flung its ships about the world that despite

*Part 1 appeared in the Journal of the Royal Naval Medical Service 1979; 65: 165-170.

many individual reports of damage and deaths due to lightning strikes the losses were regarded as inevitable In 1810 the fleet comprised 273 ships of the first to sixth rates and 391 sloops and smaller vessels a total of 664 ships [5] During any one year between 1810 and 1815 the expenditure to repair damage caused by lightning was estimated at £10,000 [6] The average losses per year in men were at the least six killed 19 injured and very many hurt by being knocked down partially paralysed or shocked [7]

This was the situation when in 1821, William Snow Harris put forward his ideas for a permanent fixed form of lightning conductor for HM ships. Snow Harris lived for much of his life at No 6 Windsor Villas Plymouth [8] He had had a short career with the army as a surgeon but by the age of 30 had returned to Plymouth There he devoted himself to the new and developing science of electricity whilst building up his local general medical practice Many of his patients and friends must have been naval officers and he was at the heart of naval matters by living near to the great dockyard and Devonport the Royal Victualling Yard and Stonehouse Hospital He must have heard accounts from his naval friends of instances of their ships being struck by lightning and thus encouraged him to develop some of the older ideas for lightning protection for ships to add his own ideas to these and finally to produce plans for a simple practical and elegant fixed form of lightning conductor His invention has stood the test of time and Snow Harris s standards for the weight and purity of copper lightning conductors for wooden masts are still applied today The success of his scheme was not only its simplicity and its emphasis on sound workmanship but also because he understood the problems set by the working and straining of masts and rigging in ships at sea Like many great inventors Snow Harris was prepared first to try out his ideas on himself Indeed he is recorded as often sitting in a small boat in Plymouth Bay during violent thunderstorms and seeing if he could safely direct lightning flashes to the sea [4]

Snow Harris invention used two layers of overlapping copper plates Connected to the usual pointed rod at the masthead they were led down a shallow groove cut into each mast Where one mast joined the next the continuity of the conductor was ensured by means of a hinge device This even allowed a mast for example the top gallant to be removed and yet for the remaining length of the conductor to be unaffected and still perfectly satisfactory for lightning protection The copper plates ran down to the step of the mast and eventually to the sheathing of the hull and also were linked to any metallic bodies in the hull by means of copper tapes running under beams Furthermore each mast on the ship as well as the bowsprit was so protected (figs 1 and 2)

Not everyone connected with the Navy thought the new invention to be a worthwhile advance and some predicted that the eleven trial ships (Table 1) would attract lightning down the conductors into the hull and so destroy themselves Furthermore, it was freely prophesied that

TABLE 1 THE FIRST SHIPS TO BE FITTED ON TRIAL WITH HARRIS'S FLAT FORM OF LIGHTNING CONDUCTORS

Date fitted	Ship	Guns	Incidents from lightning when no damage to ship or men
1820	CALEDONIA	120	
1820	BRUNSWICK	44	Struck off Rio de Janeiro
1820	LANCASTER	42	
1820	MILFORD	42	Struck 1833 and 1841
1821 1825	ASIA	84	Struck by 3 lightning flashes 1831 Again in 1841
1821	FORTE	44	
1821	SPARTIATE	74	
1821	EAGLE	0	Struck Rio de la Plata 1832 Struck by lightning off Ushant in 1842
1821	HYDRA	74	
1821 1824 1832	ACTEON	10	Struck by lightning off Central America in 1831
1821	SAPPHIRE	0	Struck by lightning many times

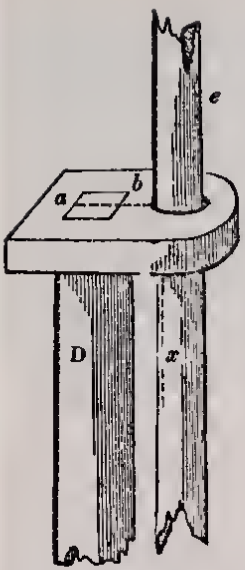

Fig 1 *Snow Harris conductor of copper plates (dotted line) continued at the step of each mast to h)*
(Illustration from Thunderstorms by W S. Harris)

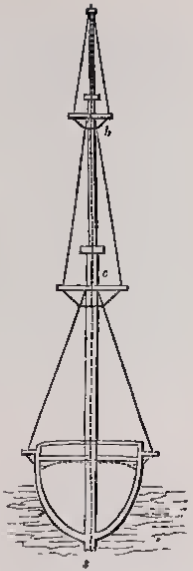

Fig 2 *The system of conductors throughout the hull*
(Illustration from Thunderstorms by W S. Harris)

the application of copper plates cut into grooves would seriously weaken the wooden masts

Snow Harris must have watched the naval journals of the time for news of the ships protected by his conductors with some anxiety and no little interest But news was so slow in arriving. The first letter he may have received testifying to the worth of the new conductors was from Commander W Turner of *HMS Dryad* dated February 1831 Cdr Turner wrote that during a tornado lightning hit both the foremast and the mizen The lightning ran down the conductor of copper plates without the least damage, the only sign being a hissing sound like boiling water

Despite the obvious interest in Snow Harris s invention a minute from the Admiralty Board in November 1831

directed that no further ships should be fitted with his lightning conductors The success or otherwise of the trial in the few ships fitted with his invention therefore depended upon whether Harris could establish that any more of them had been struck and protected completely from damage The long absences abroad of the ships meant that during the next ten years further news was scanty It was only on their return and then by diligent examination of their logs that Snow Harris was able to gain sufficient information Of the eleven ships that had been fitted with his conductors five had either not been struck by lightning or his conductors were so excellent that no one on board noticed the strike (Table 1) The remaining six five apart from *HMS Dryad* already mentioned had been struck by lightning during storms *HMS Asia* had been struck when lying in the Tagus in 1831 both *Dryad* and *Sapphire* had been struck as had *Acteon* in 1841, whilst the more famous but smaller vessel *HMS Beagle* had been struck twice the first time when off Rio de la Plata in 1832 and again during her second voyage when off Australia in 1842 In each case although the circumstances of the lightning strike were well documented no damage to the men masts or spars had occurred

Yet Harris was not idle during this period of waiting for results He continued to press for fixed and therefore safe lightning conductors in HM ships (Fig 3) His case had to be made largely through proof that ships not fitted with fixed conductors of large capacity suffered damage or worse So Harris expanded his searches to include all ships' logs In these he found the most appalling story of disaster By 1840[8] he had compiled a list of 141 cases of damage and deaths from lightning strikes in the fleet This must have made him sure that his invention must be used During the period 1834 to 1842, Snow Harris wrote numerous articles in the Nautical Magazine Annals of Electricity and The Philosophical Magazine giving details of these unnecessary accidents to men and ships He strengthened his case by putting forward both the practicality and the scientific basis on which his scheme was founded Eventually the Lords Commissioners of the Admiralty were forced by public and political opinion to undertake an enquiry into the merits or otherwise of Harris and other forms of conductors for ships A committee[9] was appointed and directed to publish its results for forwarding to the House of Commons The remit of the Committee was to answer the following questions

1 Whether in ships unprotected by lightning conductors lightning strikes had occurred whilst other ships nearby with some form of conductor had not been struck? (In other words did lightning conductors prevent strikes from lightning or as a corollary did conductors attract lightning?)
2 What conductors had been used in ships?
3 What objections were there to the conductors then in use?
4 What were the advantages and disadvantages of Mr Snow Harris' conductors as compared with others?

The result of the enquiry was a foregone conclusion The Committee earnestly recommended the general adoption of Snow Harris invention into the Royal Navy The battle for recognition was however by no means over It appears from letters that Harris[10] wrote and from Admiralty papers[11] that a lack of progress in installing the conductors was mainly due to the opposition of no lesser person than the first Lord of the Admiralty himself Gilbert 2nd Earl of Minto had held this post from 1835 — 1841 He was a man of considerable influence in the affairs of the country but his tenure as First Lord was said to be

Fig 1 Struck by lightning [illegible] HMS [illegible] 1848 after [illegible]
The lightning attracted sharply by the unprotected fighting mast and caused no injury to any ship

distinguished only by the number of members of his family who found places in naval service [12] Lord Minto's opposition to Harris scheme seems to have been based on the poor advice he himself received together with an innate conservatism Furthermore Lord Minto's problems were concerned with the need to keep the costs of a much reduced peacetime Navy within strict limits By 1830 [5] for example the size of the Navy had shrunk from the 664 vessels of 1810 to a mere 143 sailing vessels and seven steam ships The losses of men consequent upon being hit by lightning whilst at sea seemed not to trouble the First Lord [11] He found acceptable that out of 50,000 men at risk about one in 5714 were killed in this way and about twice as many injured He went on to record that the loss of life had been marvellously exaggerated

Sir William Symonds Surveyor to the Navy was also a major opponent of the fixed form of lightning conductor He stated [8] that his objections were on the ground of what he said to be the great expense of fitting them to ships and that the electricity was conducted down the masts into the ship with potentially grave results to powder magazines In addition he stated that the masts and the spars were seriously weakened by the copper plates These formidable but misinformed opponents of Snow Harris plan were joined by a clamour of voices from those who rushed forward with their own schemes for the protection of HM ships from lightning Three of the alternative plans had previously been considered by the Committee appointed by the Admiralty Each in turn had been dismissed on practical and scientific grounds Nevertheless when the results of the enquiry were published the papers and correspondence in the scientific journals became even more extreme in their

opposition Two authors were particularly critical Mr M Roberts and the editor of Annals of Electricity William Sturgeon Both men[13 14] published articles purporting to be criticisms of Harris invention on scientific grounds yet actually their statements were at the least impolite and possibly libellous

No doubt the apparent storm of criticism was not unexpected by Snow Harris for the universal experience of thunder and lightning have always made every man his own expert Completely unexpected by him was a near paralysing blow from an Admiralty minute dated only one year after his invention had received the support of the House of Commons In August 1841 Lord Minto directed that all ships were to be fitted with wire rope lightning conductors unless others be applied for when the request is to be referred to their Lordships Detailed instructions[15] for fitting wire rope conductors had previously been circulated to all dockyards as early as February 1841 together with the cost of labour When Snow Harris protested he appears to have been told that this decision was made on the grounds of the low cost of fitting ships with this type of conductor Reference was also made to an earlier letter to him in 1840 from Lord Melgund[16] which stated that Lord Minto considered that trials of various types of lightning conductors in HM ships should recommence as he considered the case for a fixed form submitted by Harris was not proven Snow Harris was not yet beaten In a letter to Faraday[17] he said that he had started again "the Herculean task to hunt out all the dusty ships records deposited at the Admiralty — and obtain published evidence of the terrible loss of life and property by strokes of lightning at sea Ten to twenty men at a time more or less paralysed whilst furling a topsail The Admiralty would not believe all this at first and I was looked on as a sort of visionary"

Harris further researches resulted in an eventual list of 280 ships and vessels damaged by lightning including 40 within five years Added to these were lists of men killed and wounded and in a separate list he included for the first time casualties in the merchant fleet These researches were published by Harris in books and pamphlets At length in 1842 the Admiralty accepted the mass of evidence by which they were then being bombarded and from that date on slowly included the fixed form of conductor into all ships with wooden masts Yet the many vessels at sea not yet due for their refits and having only the chain or wire rope conductors continued to sustain much damage from lightning

To be continued

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BOOK REVIEWS

ILLUSTRATED HANDBOOK IN LOCAL ANAESTHESIA Second edition Ed Egon Eriksson Pp 154 London Lloyd-Luke (Medical Books) Ltd £5 00

This is the second edition of a book which has achieved great popularity and has been translated into many languages Very little revision has been required Twelve contributors from various centres in Sweden have combined to describe a complete range of techniques to cover all areas of the body and incorporating all the classical blocks In most instances the writer has described only one technique for a given block selecting the one he regards as most likely to succeed This fact is a model of precise description the photographs are excellent and the beautiful coloured diagrams often masterpieces of mind and illustration

The chapter on Pharmacology has been updated in the light of the increased popularity of Bupivacaine and the introduction of Etidocaine and that on Premedication has been similarly revised to include new drugs. The chapters describing the specific techniques are virtually unchanged Small additions having been made in every fibreoptic bronchoscopy and arthroscopy Perhaps some of the recommendations regarding drugs and dosages for individual blocks could have been subjected to a little more revision with the newer agents that are available in mind It would also have been pleasing if the opportunity had been taken to give more detail on the obstetric applications of epidural anaesthesia. Wisely several chapters of dubious relevance on the neuroanaesthetic uses of Lignocaine that featured in the previous edition have been dropped.

On a minor note perhaps it would seem that even eminent professors get behind on paperwork For the reference Lofstrom also published which Professor Lofstrom gives in the 1967 edition remains unchanged in the 1979 edition! There is no doubt that Eriksson's book still retains its pride of place amongst the handbooks of local anaesthesia Not only can it be recommended to the practising anaesthetist but also to the strongest terms to the doctor who works in an isolated station and who will in emergency be called upon to perform surgery single handed For this reason the book was placed on the scale for HM Ships some years ago

RR

CLINICAL CHEMISTRY IN DIAGNOSIS AND TREATMENT Joan F Zilva & P R Pannall Third edition Pp 492 London Lloyd Luke (Medical Books) Ltd £7 00

This book appeared in the first edition in 1971 as a breath of fresh air when compared with its well known competitors in the field Its format which has remained unchanged is that although the subjects of the chapters are similar in nature the chapters are organised in a more digestable fashion cutting them up into tightly written sub chapters sub headed paragraphs This each chapter separately the physiology and pathophysiology the laboratory investigation of the tests and where applicable the indications of the results and finally details of tests in the main text plus practical high light treatment This format makes the book easy to read and learn from and easy to refer to occasionally

The book is aimed at senior clinical students house officers and junior doctors preparing for Primary FRCS or MRCP Unless my individual tastes in these groups enjoys the simple (some say turgid) prose of many classical texts this book fits their needs admirably I will admit to having used it as a primer for Primary and Final MRCPath and have many chemical pathologists.

This third edition has improved upon the first edition in that much of the tiresome pigmentation repetition has gone and it has lost one of its final appendices the point of which I failed to grasp when the lived it which that was printed was taken into consideration It has grown some 50 pages and given some 300 per cent increase in price These two problems appear endemic in the publication of texts

It has what means but these are discreet. The first and perhaps foremost is that it does not tackle adequately the problem confronting most doctors relative to the vast amount of information that they are being swamped with by laboratories I suppose reading the book and thus understanding clinical chemistry somewhat better may help However more spare time should have been given to an attempt to sort out the supply demand problem of test and request and the hapless clinician helped to pull useful nuggets out of the white of dross that laboratories pendum with exquisite precision and acumen to fill the demand Ours can only be disappointed knowing Professor Zilva that she has not taken a more infirm line in educating clinicians in the weaknesses and strengths of laboratory medicine in diagnosis and treatment Such knowledge might help break this increasingly costly test/request spiral

A specific criticism may be levelled at the chapter on the kidneys and renal calculi wherein the old vague indigestable rubbish that has appeared in most texts since the appearance of original papers of the 60s has been regurgitated concerning the renal countercurrent concentrating mechanism Only is forced to the conclusion that the authors do not understand the concept and its explanation

Concerns apart this book is still far ahead of the field and so easy to use that it is a must for every senior student junior doctor working for higher clinical qualification and would book shelf

HAC

1979 YEARBOOK OF NUCLEAR MEDICINE. Eds. [illegible] Quinn III & Stewart M. Spies. Pp 374. [illegible] YB Medical Publishers Ltd. £22.75.

[illegible] excellent book like its predecessors continues [illegible] nuclear medicine history as one of the [illegible] influential and comprehensive reviews of [illegible] embracing a dramatic of techniques [illegible] and research upon seldom before [illegible] medicine. The selected material [illegible] gleaned from over 500 600 journal articles [illegible] distinguished panel of editors and [illegible] major developments in the variety of [illegible] concerned in the practice of nuclear [illegible]

[illegible] the usual format the sections [illegible] Radiation Physics and Instrumentation [illegible] Pharmacy and Radiation Biology in the [illegible] of physicians in a section by [illegible] review of progress in the [illegible]

[illegible] major advances in the field of [illegible] highlighted [illegible] labelled [illegible] agents (2) [illegible] studies and [illegible] cell labelling techniques [illegible] arterial thrombi [illegible]

[illegible] emphasised as a radical [illegible] method of obtaining reliable [illegible] two gamma camera [illegible] medium and [illegible] are reviewed.

[illegible] possibility [illegible] germanium 68 [illegible] increase in nuclear cardiology [illegible] of the [illegible] welcomed [illegible] computer [illegible] can be [illegible]

[illegible] those [illegible] test work in [illegible] language of progress in [illegible]

MAM

AN INTRODUCTION TO MEDICAL SCIENCE. Neil Durkin. Pp 290. Lancaster: MTP Press Ltd. £6.95.

This volume is subtitled "A Comprehensive Guide to Anatomy, Biochemistry and Physiology" — and the contradiction of an introduction which is a comprehensive guide is exemplified by the attitude of one answer to the book. It is nicely printed with [illegible] diagrams of [illegible] and [illegible] an [illegible] to open and to read. The format is standard with a chapter to each major system and the amount of [illegible] in each chapter varies, always with an emphasis on function. The [illegible] and detail of the book suggest the target population is university rather than [illegible] O level or even A level human [illegible] the approach is more suitable for the latter and the author addressed [illegible] 'Beginners'. It was surprising to find the publishers and printers were British although the author has an address in Ohio USA. Because the book has a transatlantic flavour especially in the excellent index.

DEM

THERAPEUTIC SYSTEMS. Klaus Heilmann. Pp 143. London: YB Medical Publishers Ltd. £11.50.

The last two decades have seen dramatic developments in new and better drugs which have tended to overshadow the mounting advances which have been made in both the concept and [illegible] implication of drug delivery systems.

This book is an English translation which has been completely revised and updated from the German original. It opens with a section of definitions and simple explanations which are helpful for those who are unfamiliar with pharmacokinetics, membrane characteristics and physiology, bioavailability and biological half-life etc.

Therapeutic systems permit specific therapeutic control by the delivery of a drug to a particular target organ or tissue for a specified length of time. The [illegible] are discussed in some detail and include good explanations of techniques applying drug delivery [illegible] diffusion osmosis [illegible] pumps. Infusion systems for delivery of drugs and adaptations of the gastrointestinal and transdermal routes for therapeutic systems are also discussed and their limitations pointed out.

Considerable attention is given to those therapeutic systems designed for local use such as the Ocusert diffusion controlled system to release pilocarpine in the eye and ophthalmologists will find this an exciting section. There is a similar section on the Progestasert uterine therapeutic system for the delivery of a contraceptive agent which includes a review of the experimental work on this new line of contraceptive development.

Future developments such as the osmotically powered minipump and the concept of therapeutic systems with a closed circuit loop are briefly described and serve to enlighten and stimulate our imagination for the future.

Outwardly this book clearly has a limited appeal but to the [illegible] the concept of controlled drug delivery and its integration into therapeutics [illegible] medicine. We should welcome the application of these exciting new techniques which are likely to influence us all.

RHR

PSYCHIATRY. W H Trethowan. Fourth edition. Pp 478. London: Baillière Tindall. £4.50.

This volume was formerly known as Anderson & Trethowan's Psychiatry and is one of this publisher's series of concise medical textbooks. It is a comprehensive text including chapters on mental handicap and child psychiatry. As is frequently the case such an approach has limitations. For while the text touches on such diverse topics as masturbation, Capgras syndrome and the role of the social worker, it does of necessity only deal briefly with some topics. The distinguished author expounds an eclectic approach to psychiatry in a balanced way. There is an excellent chapter on psychopathology based on the phenomenological approach of Jaspers. I particularly liked the use of the term 'abnormal emotional reaction' as an alternative to the more traditional term 'neurosis' with its implications of aetiological deficit.

The chapter on alcoholism and drug dependence is perhaps of particular interest to a naval medical officer. While the author quotes in full the World Health Organisation definition of alcoholism, he

militiamanel dissatisfaction Griffith Edwards criteria for the provisional description of alcohol dependence as a clinical syndrome and in many series are more objective criteria than those of the World Health Organisation (Edwards G & Gross M M (1976) Alcohol Dependence provisional description of a clinical syndrome BMJ 1058-61)

There is also a comprehensive list of suggestions for further reading covering some 60 additional titles certainly an adequate list for a basic textbook

Although I have not previously used this text I would recommend it as a reference text to a medical student or as initial reading to a colleague embarking on psychiatric training or to a colleague in general practice who has an active interest in psychiatry The volume's main shortcomings are related to its attempt to be India comprehensive Nevertheless it is a balanced text using an eclectic approach to psychiatry based as one might expect from this author on a sound understanding of phenomenology

PJMU

THE SURGEON PROBATIONERS R S Allison Pp 142 Bellast Blackstaff Press Ltd £6 95

This foreword to this book is written by Surgeon Vice Admiral Sir James Watt who knew Richard Allison and worked under R J Willan at the Royal Victoria Infirmary Newcastle As one would expect Sir James illuminates the scene he knew and in his last paragraph points its underlying message and perhaps more importantly reminds us that naval service should be fun It was certainly fun for the Surgeon Probationers and the memory of it remained with many of them throughout their professional lives

This slim monograph is in two parts The first records the continuing search for the Final Word by the Surgeon Probationers These final year medical students entered the Navy as Surgeon Sub Lieutenants RNVR to ease the shortage of medical officers Richard Allison was one of them and despite a subsequent career as a neurologist medical historian and medical archivist never lost his affection and attachment to the RNVR and the Navy The reminiscences recorded are fascinating and the picture of Hastie in 1918 and the end of the war in the Mediterranean are particularly vivid It is of great interest that the achievements and service of these young medical students particularly those from the medical school at Ballast should be so elegantly recorded

The second part of the book reproduces and records the booklet produced by Surgeon Rear Admiral R J Willan RNVR for the instruction and guidance of the young Sub-Lieutenants Before his death Dr Allison and I had some correspondence on this excellent booklet and Allison's copy was reproduced for the Director of Naval Medical Staff Training to use as a basis for pantomedic instruction Its plain simple topical good sense deserves a wider audience and it is good that it shares the recorded service of the Surgeon Sub Lieutenants since the booklet guided so many of them in emergencies for which they were otherwise largely unprepared

JABH

CAPTAIN OWEN OF THE AFRICAN SURVEY. 1774 1857 E M Barrow F 248 Rotterdam A A Balkema £15 30

This is a delightful book to own to read and to return to consult but difficult to review It is full of atmosphere and fact and for me has added knowledge of the author an academic with a feel for people a consultant naturalist and a Civil Consultant in the Navy and FRGS I suppose the book picker says it all The resolute face of Admiral Owen his involvement with the African Survey and of the first systematic naval hydrographic surveys His landed retirement to the family estates in Campobello New Brunswick His involvement in the fight against the slave trade such an essential part of the Navy's Pax Britannian since it kept it sea

Ted Barrows has obviously enjoyed his researches to produce this account researches in many places with many jungle oozy many years That pleasure and mainly in the book which gives a detailed overall account of a scientific officers during the great years of British naval supremacy W F W Owen longhi at the Glorious 1st of June — the last great 18th century naval battle fought in the style of the 18th century before the new tactics of annihilation of the enemy became the Nelson vogue but when British seamanship and valva in attack was already established The arithmetic and detailed lines and images illustrations make this book also for all interested in naval history Admiral Owen a latter of congratulations to Beaufort when he not Owen was appointed Hydrographer to the Navy to succeed Parry says much for Owen's character and judgement

But this history of the Owen family is an additional looms and insight into the times The Owen family acquired their Canadian lands in 1770 and there is much of early Canada in the book And Admiral Owen's life in Campobello after leaving the Navy in 1835 illuminates life in the antebellum which had been in his family's possession for 64 years on his return to a haven of peace and useful occupation with which he wished to fill his retirement after a life of resolute achievement Only the very best could survive so long in those days And few today could achieve so much

JABH

OBESITY AND ANOREXIA NERVOSA A QUESTION OF SHAPE Peter Duffy and Joan Gomez Pp 121 London Faber & Faber £2.50

This slim paperback volume is in two sections one dealing with Obesity and the other with Anorexia Nervosa each illustrated with a series of case histories

Both authors are psychiatrists who have concerned themselves extensively with the psychiatric aspects of nutrition and the book is written exclusively from the point of view of these aspects For example the importance of the management and the role played by deposits of brown adipose tissue in the pathogenesis of obesity is not even mentioned

Nevertheless this is an interesting and informative little book which should be of interest to all those who have encountered either of the above conditions individually the reasonably intelligent layman Normal and abnormal feeding behaviour is discussed together with the psychological reasons as to why some people starve themselves whilst others remain fat Various dietary

myths nurse nipulated and a rational approach to feeding avoiding surgery or drugs as far as possible is explored

This book includes lists of additional reading references and helpful organisations with addresses which should prove useful

AMH

CASH'S TEXTBOOK OF MEDICAL CONDITIONS FOR PHYSIOTHERAPISTS Ed Patricia M Downie FCSP 6th edition Pp 335 London Faber & Faber £2 25

This well known textbook for physiotherapists has been extensively updated and well illustrated with excellent line drawings The title is however misleading as only some of the medical conditions treated by physiotherapists are covered mainly those of respiratory and vascular disorders being dealt with in separate chapters

Although a number of chapters have been revised and re written the division of subject matter between sections of textbooks disrupts the logical presentation which becomes difficult to follow The contributions on polyarthritis inflammatory arthritis and thrombosis provide excellent background reading for student physiotherapists the contribution on the techniques of splint making being particularly useful The subject of paediatrics is well covered and clearly explains the important milestones of development and their significance when planning treatment programmes and applying techniques of treatment

With so much emphasis now being placed on the examination and assessment of the patient it is regrettable that the section which should contain information on this subject The chapter on Non articular pain concludes with the summary in the paragraph of which shoulder regular and knees should be described No attempt has been made to provide the reader with a logical order of questioning to explain the reason for specific signs and symptoms More information needs to be included on limiting the problems of pain in planning treatment programmes and the modification of techniques

Although this section on Principles of manipulation appears to be entirely out of place in a textbook of medical conditions this edition can be recommended to student physiotherapists studying rheumatoid disease and paediatrics and will provide useful supplementary material when used with other textbooks of this series

GJ

PLANNING FOR A FAMILY — AN ATLAS OF MUCOTHERMIC CHARTS John Marshall Pp 119 London Faber & Faber £2 25

Professor Mindell who is Professor of Clinical Neurology in the University of London has produced this book for those of the less gullible who as the introduction states wish to have a child but are finding it difficult to conceive It will also help those who wish to avoid conception by observing the infertile periods

My initial impression of the book was of a large number of temperature charts (over 100 in all) with one or two minute sections of pain and scanty remarks about them on the opposite As an example of these statements we are told Mrs Y observed that his slow rise lasted eight days from day 11 to day 18 so that the risk of FIRE is unpunitive above the previous SIX limit but only just with a slight edge !

In the section entitled the Mucus Symptom the following comment accompanies Figure 45 which is a blank sheet except for some lines on the bottom half — If the day after the wet day is dry again intercourse can be resumed It is only when dry days follow a wet day that was not done to intercourse that intercourse cannot be resumed as was explained in Figure 44

My feelings of confusion were further enhanced by reading Rule 4 of Ten Rules for Intercourse before and after Ovulation which states that The formula is Subtract 18 from the number of days in the SHORTEST of your last six cycles This will give you the day you must stop intercourse even if the days are still dry For example if your last SIX cycles were 30 27 29 28 30 days then 27 was the shortest 27 — 18 = 9 Therefore do not have intercourse from day 9 inclusive on if the days are still dry days

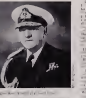
Passages from this little book have been quoted at some length in order to convey to the readers of this Journal the type and style of its contents A reasonable idea of the mental manipulation one has that the lay reader is expected to be capable of can only be gained by doing this This book cannot be recommended as being useful in practising doctors nor is it really intended to be They might however be able to recommend it to those of their patients who are sufficiently intelligent diligent and well motivated about their fertility or lack of it in stick to the guidelines laid out in this expensive paperback It may help them to understand their problem further but it should never be allowed to replace sympathetic advice and explanation by a family doctor

PRSE

SERVICE NEWS

OBITUARIES

SURGEON VICE ADMIRAL SIR CYRIL MAY KBE CB MC FRCS, LRCP Medical Director General of the Navy from 1951 to 19[illegible] [illegible] September 1[illegible]7 1970 at [illegible] [illegible]



Surgeon Rear Admiral [illegible]

My [illegible] was in [illegible] Naval Hospital [illegible] [illegible] friendliness [illegible] One of [illegible] literature [illegible] from the hospital library [illegible] afternoon at Hong Kong [illegible] which I should [illegible] still a Surgeon Lieutenant [illegible] responsible [illegible] China Fleet while [illegible] in Hong Kong. The [illegible] had about 70 beds and [illegible] ships where emergency [illegible]

Cyril had a [illegible] throat [illegible] was immured in the Medical Department [illegible] from December 1938 [illegible] 194[illegible] [illegible]

only two further hospital appointments [illegible] during the rest of his naval career. In 1[illegible] promoted Surgeon Rear Admiral and in 195[illegible] Medical Director General.

On [illegible] the [illegible] Medical Director [illegible] I had previous experience of the Department [illegible] I was surprised that of an MDG [illegible] [illegible] staff had a Division [illegible] [illegible] remember his sympathetic [illegible] opportunities [illegible] [illegible] and how he took [illegible] I brought [illegible] the middle [illegible] while we waited for the [illegible] [illegible] I call upon MDG and [illegible] He promised [illegible] monthly bulletin which kept medical [illegible] abreast of policy and [illegible] This did something [illegible]

[illegible] remembered old friends [illegible] [illegible] was always [illegible] from Cyril [illegible] He was a modest man [illegible] He had [illegible] in the Army in the [illegible] [illegible] War [illegible] [illegible] Military Cross.

SURGEON REAR ADMIRAL GEORGE PHILLIPS CB MB ChB DLO died on January 14 1980 [illegible] and the funeral service was held [illegible] RNH [illegible] on January 18.

Surgeon Vice Admiral Sir Derek Steele Perkins writes

George Phillips was educated at Dover College and entered Edinburgh University in 1921 where he graduated in 1926. He entered the Royal Navy later that year and transferred to the permanent list in 1929 after serving a commission in the Red Sea in *HMS Clematis*. Subsequently he was appointed to *HMS Nelson*. His interests lay in surgery and following a course at the Postgraduate Medical School Hammersmith he took the Diploma in Laryngology and Otology.

In 1938 he was appointed to RN Hospital Bighi Malta where he served until the end of the Siege of Malta working, both in the hospital and in the

[redacted] in 1946 he was [redacted] Royal Naval Hospital at [redacted] and later [redacted] times took him to the [redacted] homing cruiser *HMS Devonshire* and thence in 1950 to RNH Trincomalee as Medical Officer in Charge.

His last appointment on promotion to Surgeon Rear Admiral in 1958 was to RNH Haslar which post also included the task of Command Medical Officer. He was decorated with the Order of Commander of the Bath in recognition of his service.

George Phillips enjoyed his life in the Service to the full. In both gave and gained much from it. He was an able and skilled surgeon with a great sense of duty to those who came under his care. He was an interesting and generous messmate, a keen golfer and fisherman and also rearing elevated a great deal of time to the cultivation of shrubs in his garden at Petersfield. He was a stimulating character and had the great gift of imparting enthusiasm to others and was responsible for initiating many of the great changes that have occurred in recent years at Haslar.

He is survived by his wife and a son and daughter.

A memorial service for Admiral Phillips was held at St Luke's Church, RNH Haslar, on March 17.

SURGEON REAR ADMIRAL (D) W L. MOUNTAIN, CB OBE, LDS RCS died on February 15, 1980 at the age of 71. Admiral Mountain was Director of Naval Dental Services 1960-63. An obituary will be published in the next issue.

SURGEON COMMANDER JAMES DOW, MB; ChB, DPH, died suddenly on December 27, 1979, at the age of 69. An obituary will be published in the next issue of the Journal and any personal recollections would be welcomed by the Editor.

RN MEDICAL AND DENTAL OFFICERS

HONOURS & AWARDS

New Year Honours 1980

Member (Military Division) of the Most Excellent Order of the British Empire

Surgeon Commander (D) [redacted] RN

Member (Military Division) of the Most Excellent Order of the British Empire

Surgeon Commander [redacted] RN

HIGHER QUALIFICATIONS

Surgeon Rear Admiral F J O'Kelly — MFOM

Surgeon Rear Admiral R J W Lambert — MFOM

Surgeon Commander J A Bakhai — FRCS

Surgeon Commander R J Carmichael — MFOM

Surgeon Lieutenant Commander S H Desborough — MRCGP (distinction)

Surgeon Lieutenant Commander N C Drew — MRCOG

Surgeon Lieutenant Commander F M J Hiles — MRCPath

Surgeon Lieutenant Commander N F Lightfoot — MRCPath

Surgeon Lieutenant Commander C Orchard — MRCOG

Surgeon Lieutenant Commander R J Wilson — MRCGP

GILBERT BLANE MEDAL

Surgeon Commander F St C Golden is to be awarded the Gilbert Blane Medal for 1980 for his thesis 'Physiological changes in Immersion hypothermia with special reference to factors which may be responsible for death in the early rewarming phase'

Parkes Memorial Prize

Following the announcement of the award of the Parkes Memorial Prize to Surgeon Commanders W D McNicoll and S G Seaman (J roy nav med Serv 1979 65 188) the Editor received a personal letter drawing his attention to inaccuracies concerning previous awards of this prize. The previous awards have been researched and we think the present list is correct and not without interest

1935	Surgeon Lieutenant J L S Confer
1947	Surgeon Lieutenant Commander F P Ellis
1954	Surgeon Commander G H G Southwell Sander
1956	Surgeon Commander C P Collins
1959	Surgeon Captain F K Fraser
1963	Surgeon Captain W I Farbes Guild

COMMENDATION

Surgeon Lieutenant D Morgan
Royal Navy

Surgeon Lieutenant Morgan was airborne in Sea King 5/4 which was launched in the evening of 30 December 1978 to rescue two girls who were stranded on Chapel Rock near Perranporth beach. The aircraft took off in bad weather conditions and as the sortie progressed these steadily worsened to the point where at one stage the aircraft was in great difficulties attempting to return to Culdrose.

I commend Surgeon Lieutenant Morgan who quite recently joined the Royal Navy on the courage he showed in such treacherous conditions and on his professional approach to his duties on this occasion and on other rescue missions. His conduct has been in keeping with the best traditions of the Fleet Air Arm.

E R Ansin
Rear Admiral

Surgeon Lieutenant Morgan [illegible] in recognition from Rear Admiral [illegible] Flag Officer Naval Air Command [illegible] Royal Naval Air Station Culdrose

The rescue was described [illegible] 824 Squadron which was flying the SAR [illegible] Christmas period. It [illegible] returned to Culdrose but was told [illegible] aware with [illegible] just in time the [illegible] Feldjen out with Morgan [illegible] the crew then recovered [illegible]

PROMOTIONS AND APPOINTMENTS

To Surgeon Rear Admiral on April 28 1980 and to be appointed Director of Medical Policy and Plans in July 1980

Surgeon Commodore J Keeling CBE QHP

To Surgeon Rear Admiral on July 28 1980 and appointed Surgeon Rear Admiral (Naval Hospitals)

Surgeon Captain J M Haughton MVO QHP

To Surgeon Rear Admiral (D) on February 25 1980 and appointed Director of Naval Dental Services on March 3 1980

Surgeon Captain F R J Dale OBE QHDS

To Surgeon Lieutenant Commander

A G Marsden G L Newcombe

To Surgeon Lieutenant Commander (D)

M A Critchlow M J Lovell I E C Mahon J D Roberts James A D M Watson

To Surgeon Lieutenant

J K Romage J D Tallitsky

To Surgeon Lieutenant (D)

A M Prosser S I Robey J R J Sharples

Provisional selections for promotion to date 30 June 1980

To Surgeon Captain

M Hatfield J M Young

To Surgeon Commander

R D Curr N S Hopkins G Smith A F Steele Perkins

To Surgeon Commander (D)

J L Kelly

NEW ENTRIES

Surgeon Lieutenants C J Davis M L Ward

Surgeon Sub Lieutenants D A Hett C J Howells C M James A Logan R W Smith

Surgeon Sub Lieutenants (D) J P Hindle K F Lea J A Lock G J Lumley M T R A Wood

TRANSFERRED TO FULL CAREER COMMISSION

Surgeon Lieutenant Commanders R T Counter M R D Connell A F Steele Perkins

Surgeon Lieutenants (D) D C C Alexander I H Hirker M J Lovell M W Weston

TRANSFERRED TO MEDIUM CAREER COMMISSION

Surgeon Lieutenants M A Farquharson-Roberts
A R Mogridge R A Payne
Surgeon Lieutenants R F Ashton D G Brace
P H Cooper
M C Frampton C J Kalmus N V Morgan
R J H Robertson G A Turner P G N G Williams

RETIREMENTS

Surgeon Captain A McEwan OBE
Surgeon Captain J D Walters
Surgeon Commander K J Martin
Surgeon Commander A A Russell

RELEASED FROM SHORT CAREER COMMISSION

Surgeon Lieutenant Commanders S H Oxsborough
P J Harvey D Ireland

Surgeon Lieutenant C G Waite
Surgeon Lieutenant (D) A L Jacob (Mrs)

President of the Society of Anaesthetists of the South West Region 1978/79

Surgeon Captain N G B Hersey

"The Society of Anaesthetists of the S W Region has done it again! The only Anaesthetic Society which has had as its President a distinguished veterinary surgeon is the only one which now has as its reigning President a serving naval anaesthetist. These indiscretions are echoed in Surgeon Captain N G B (Nick) Hersey's career. Joining the Navy in 1952 having graduated from the Middlesex, he served in a frigate in the Korean War. Returning from Korea in 1954 onboard the Troopship *Empire Windrush* it promptly caught fire and sank in the Mediterranean. He would wish me to point out that the ship belonged to the Army and that such claims thereafter was not responsible for the outbreak of fire. In 1957 he decided to become an anaesthetic specialist and rather belatedly President who trained under the three past Presidents who were elected from outside the region — Sir Robert Macintosh, Roger Bryce-Smith and Peter Dunnill. His naval career prospered because, apart from his anaesthetic abilities, his cheerful mindfulness is allied to an administrative and organising ability which took him in 1977 to the post of Consultant Adviser in Anaesthetics in the Navy. These qualities are reflected in his able chairmanship of our committee and when presiding at our meetings.

During his time at Derry in Malta he acquired such a detailed knowledge of its flora that other botanists on the island gladly consulted him, so it is not surprising that his great hobby is gardening. Gifted with green fingers, a heated greenhouse propagating and cold frames ("you name it, he can grow it").

Since our Society has been entertained by our naval colleagues both at Plymouth and Portsmouth it is only fitting that we should elect a naval president and none could fill the post more ably than Nick Hersey."

JS

* *Extract from Anaesthesia Points West Summer 1979 by kind permission of the author Dr James Smith and Editor*

SUPERCESSION CEREMONY

Surgeon Rear Admiral J A B Harrison Medical Director-General Designate bade farewell to the Institute of Naval Medicine on February 5 He is shown with his successor as Dean of Naval Medicine Surgeon Rear Admiral R J W Lambert and senior officers at the entrance to the recently opened new building at INM

MEDICAL SERVICE OFFICERS

PROMOTIONS

To Lieutenant
P Dunn

To Acting Sub-Lieutenant
D R Harrell J R Dolphish M A Wagstaff

RETIREMENT

Lieutenant Commander J E Hammond

ROYAL NAVAL RESERVE

New Year Honours 1980

Queen's Honorary Dental Surgeon
Surgeon Captain (D) Keith Kemp

PROMOTIONS

To Surgeon Lieutenant Commander
C H Boyd

To Surgeon Lieutenant Commander (D)
C J H Roberts

To Surgeon Lieutenant
A D Canrer

RETIREMENT

Surgeon Commander R Woodside RD

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

Miss V F C [illegible] RRC [illegible] Royal Navy
[illegible] Matron-[illegible] Naval Hospital

To Principal Matron on February 25 1980 and appointed Principal Matron (Naval Hospitals)
Miss E M Northway

Appointed Matron RNH Haslar on February 4 1980
Miss F V Wade

Appointed Matron RNH Plymouth on January 14 1980
Miss P M Grayston

To Superintending Sister
Mrs V C Cl[illegible]kfield Miss N I Rann
Miss G E Williams
Miss U M Winfield

To Senior Nursing Sister
Misses L I Bagley I D Beach P N M Harvey A Honeyball A B Manderville J A Moss K Randall A L Robertson

NEW ENTRIES

Misses E A Day L Gibbon S I Hutchinson M L Shields A M C Thorpe S C Walker

NOTICE

THE EDITOR invites medical and dental staff to send in original papers on professional subjects travel personal experiences and other matters Items of news and matters of interest to the naval medical service will be welcomed from ships and establishments on home and foreign stations Notices of births marriages and deaths are inserted free of charge to subscribers

Articles and communications may be sent at any time to **The Editor, Journal of the Royal Naval Medical Service, Institute of Naval Medicine, Alverstoke, Hants, PO12 2DL** Two copies should be submitted in typescript Double spacing should be used throughout References should be in the Vancouver style (J Roy Nav med Serv 1979 65 179)

The Journal is published three times a year (three numbers comprising one volume

Subscriptions

The subscription rate will be increased as from January 1 1981 For RN and RNR medical and dental personnel on the active or retired list and for Consultants to the Royal Navy the subscription will be £5 00 per annum (post free) payable on January 1 each year

For all others not in the above categories the subscription will be £7 00 per annum (post free) $15 00 USA & Canada

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Journal
of the
Royal Naval Medical Service

 ISSN 0035 9033

Surgeon Vice Admiral J. A. B. Harrison, QHP, MRCS, LRCP, DMRD, FRCR, Medical Director General (Naval)

Editorial

For some years Medical Directors General have chosen the Spring to come and go With its indefinable aura of rising sap and new green leaves this is a happy state of affairs, for few of us fail to experience some upsurge of enthusiasm for our individual tasks, and for the Service to which we belong, in the face of this repeated annual miracle Entering the 1980s with the new political technical and ecological challenges and risks that they pose, it is appropriate to review some of the achievements of the retiring Medical Director-General partly in order to laud him but partly, and more critically perhaps to learn from him At the same time whether we envy or sympathise with his successor depends on our individual outlook In all events we welcome that successor to the hottest seat in our Branch

Surgeon Vice Admiral Sir John Rawlins KBE FRCP FFCM FRAeS was Medical Director General (Naval) for three years until his retirement at the end of March this year It was his misfortune to preside over our Branch during the most critical period of manpower shortage that any of us can remember Long accustomed to stretching a pint to fill a quart even that pint has shrunk to a gill and this at a time when the very nature of the task of the Medical Service is expanding and diversifying Paradoxically a large share of the credit for recognising the expanded role of uniformed medical services in the preventive and promotive fields of military medicine accrues to John Rawlins as even the most casual glance at his career will show

A man of many interests we have benefited from and will remember him for the breadth of these His persuasive flair as a speaker the encouragement he provides for furthering the ideas of so many of us, and the unique enthusiasm he brings to bear in each field that he enters have kept him at the sharp end of naval medicine for the past thirty years

A clinician in his early years, and originally an RNVR National Service entry in 1947, he rejoined the RN in 1951 and for the next fifteen years pursued the superficially unlikely combination of Naval Aviation Medicine and Diving Medicine culminating in the acceptance of the then revolutionary aircraft underwater ejection system but with many by products in the protective fields of biomedical engineering en route Since the latter 1960s he has guided the direction of naval biomedical research from the Ministry of Defence and the Institute of Naval Medicine As Medical Director General he continued actively in his own fields and managed to find the time to take a detailed interest in the lines of activity that he had originally fostered Conscious always that the prime task of the Branch lies in naval and combat medicine perhaps his greatest achievement was to gain recognition of this within his own organisation, in the higher levels of the Navy and in the upper echelons of the medical profession at a time in history when all the pressures on our Medical Service have been directed at levels

of medical excellence in an essentially civil role A great traveller and an accomplished diplomat while the personal links he has fostered with the medical personnel of allied navies must go with him the organisational links he has built up will survive to mutual benefit Commended by the United States Secretary of the Navy for his contribution to diving research in 1970 our US Navy friends particularly at the Naval Medical Research Institute at Bethesda, will long remember their ' Sir John '

He would not wish me to catalogue his naval and professional honours and space would not permit However it must be rare and merits record to have gained an MBE an OBE and finally a KBE, and to have won an Erroll Eldridge Prize a Gilbert Blane Medal, the Arnold D Tuttle Memorial Award of the Aerospace Medical Association and finally the Chadwick Medal and Prize in succession

We wish John and Diana a happy retirement Whilst we know it will be a busy one and we expect to see him active in his own fields for many years to come nevertheless we hope it allows him to pursue the many leads and interests that life in the Service throws up but so often denies time to explore

To his successor Surgeon Vice Admiral J A B Harrison QHP MRCS LRCP DMRD FRCR my predecessor in this Institute and the former Editor of this Journal we offer friendship loyalty and support As a former Deputy Medical Director-General he knows the shape of the job he is taking on He has a wide understanding of the role and potential capabilities of the Branch he directs He has taken over at a critical point in history There is much to be done and we wish him luck success and enjoyment in a difficult but potentially most rewarding appointment

Finally although we should not presume to offer advice to a Medical Director General we might remind ourselves of David Lloyd George's words at the Paris Peace Conference in January 1919

The finest eloquence is that which gets things done the worst is that which delays them

A Review of Three Years Experience of Medical Advice to Seafarers by the Casualty Officer, Royal Naval Hospital Plymouth, via Portishead Radio (W/T Medico Portishead)

N. F. Brayley

Abstract

Since August 1975 successive Casualty Officers at the Royal Naval Hospital Plymouth have been dealing with medical problems in the Mercantile Marine at sea by telegram and radio telephone through Portishead radio. Analysis of the medical problems for which Masters have sought advice, the range of drugs prescribed, the medical skills expected of lay seafarers and the problems involved in communicating medical data are reviewed. Diet associated factors such as alcohol and obesity appeared to have a significant aetiological role in many of the diseases reported.

Introduction

A free medical advice service has been operated by the Post Office for some 50 years. The service, known internationally as 'Medico' enables ships of all nationalities to obtain advice speedily on any medical problem free of charge. From small beginnings initiated by Rome Maritime Radio Station in 1935 the 'Medico' service has been extended to virtually all the major maritime nations which have long distance radio communications of some sort (Table I). Only those underlined have radio telephone facility. All those listed have 'Medico' facilities at the recommendation of the International Labour Organisation (ILO).

The Medico service was well established in the United Kingdom before the formal ILO recommendations. The service has steadily expanded over the years in this country. In the year ending March 31 1978 the Post Office 'Medico' facility in this country had handled cases requiring treatment involving the transmission of over 484 W/T telegram messages and 427 R/T calls. Approximately half of this total work was carried out by the Casualty Officers at the Royal Naval Hospital, Plymouth, via Radio Portishead.

No charge is made for these messages which are sent in plain language or in a special code devised to meet the requirements of all ships no matter what the nationality. The full cost of the service is met by the Maritime Division of the Board of Trade. The service is operated by the Post Office through 12 coastal radio stations to which is attached a medical authority to whom the requests for advice are sent. The radio stations are listed in Table II.

Royal Naval Hospital Plymouth The four hull 11—a the—h 1—bl— for a helicopter landing site

Wick and Humber have a large R/T Medico load probably due to North Sea oil and fishing fleets

Each coastal station overlaps its flanking neighbours in range so that our coastal waters are adequately covered A continuous listening watch is maintained on both radio telegraphy and radio telephone frequencies and the stations have a range by day of 250 to 500 miles and considerably more by night For ships in more distant waters the long range station at Portishead provides world wide coverage and where ships do not possess the radio equipment for long range communication messages for Portishead can be relayed ship to ship or ship to shore until received by that station which can transmit the reply direct to the ship making the enquiry

The Medical Advice Service is primarily for the benefit of ships which do not carry a doctor on board, but sometimes a ship's doctor will use it for consultation When a case of injury or sickness occurs which is beyond the Master's immediate knowledge and skill all he has to do to obtain advice is to send a radio message prefixed with the signal XXX, which will ensure its priority over all other traffic except SOS' Immediately the message is received on shore it is telephoned to the medical authority The doctor's reply is usually a request to the ship for additional information after that, messages are exchanged until a provisional diagnosis is reached and advice on appropriate treatment rendered The advice provided is primarily humanitarian but in the light of today's competitive costing of large bulk carriers time spent in a diversion or further reduction of manpower can hazard the shipping company or ship respectively A Master is therefore always keen to share such costly decisions

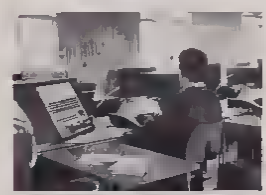
When a ship equipped with a radio telephone is within renge of a coastal station the call can be linked by the station operator to the medical authority by

means of the inland telephone system thereby enabling doctor and ship's Master to discuss the case fully and directly For a ship's Master to treat a case once the trouble is diagnosed the doctor must know what medical facilities are available on board

In the case of British ships sailing from the United Kingdom they are required to carry a copy of the latest edition of the Ship's Captain s Medical Guide[1] and the Merchant Shipping Medical Scales [2] Arrangements have been made for all the medical authorities to be in possession of these books so that they can prescribe in accordance with the medicaments carried by the ship and where necessary, by reference to passages in the medical guide

The advice provided by medical authorities whether as hospital physicians or private practitioners is given freely and in addition to their own professional duties

Portishead Radio/Telegraphists



Portishead Wireless/Telegraphist

Radio Portishead

Radio Portishead is a large GPO Communications Centre at Burnham on Sea linking Mercantile Marine by wireless telegraphy (W/T), radio telephone (R/T) and telex to all parts of the world It is the busiest W/T station in the world with more traffic than both the Americas put together It offers world wide R/T communication and is a potent and growing foreign exchange earner, capturing an increasing market in radio communications

Over the past 18 years there has been an increase from 7% to 70% of the total foreign traffic handled by the station. The operators are expected to converse routinely in English and French and occasionally in German

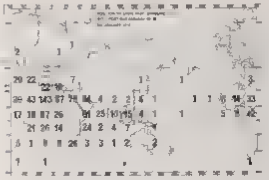
The bulk of the traffic is from shipping within the longitudes 90° West to 90° East Maps 1 to 4 show the distribution of shipping using Radio Portishead for both W/T and R/T respectively for the 24 hours of January 6 1978 This distribution along the main shipping lanes of the world reveals the origin of the bulk of the Medico calls The more desperate calls however are invariably from shipping remote from the main shipping lanes where medical isolation is greatest

The number of cases handled annually by W/T and R/T Medico Portishead for the period 1975 78 are given below

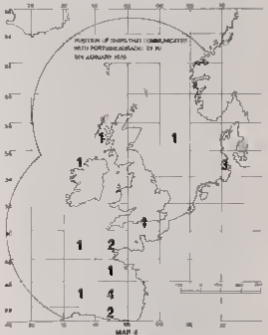
	Telegram W/T	R/T	Total
1975 76	117	14	131
1976-77	121	12	133
1977 78	95	21	116

The average W/T case uses a total of 50 words in three messages. The average R/T case lasts a total of ten minutes and usually involves one return call

One case of cholecystitis on a West African ship was assessed and managed using only the international code of signals This facility provided the only common ground for communication



MAP 2



MAP 4

A second opinion may be sought one ship requesting our advice after first contacting Scheveningen Radio

Analysis of Medico Cases

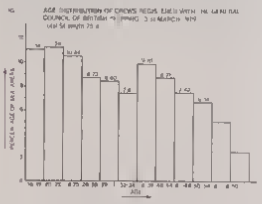
The population in question

Analysis of the uses of Medico Radio Portishead by registered nationality revealed that out of 123 cases 73 were United Kingdom registered ships the remainder were Liberian Greek Panamanian Hong Kong and Singapore registered

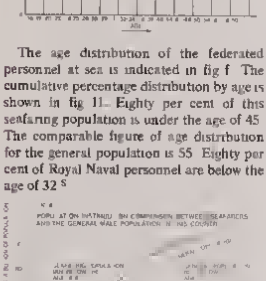
Figures from the General Council of British Shipping (GCBS) indicate that the majority of United Kingdom shipowners are members of the GCBS and these are known as federated companies the remainder a smallish minority (mostly coastal) are non federated companies Only about 10% of British seafarers work in non-federated companies Personnel at sea in federated ships on March 31 1978 totalled 75 477[3] In addition there were about 20 000 Asiatic ratings employed on United Kingdom registered ships plus about 8 000 seafarers on non federated UK ships

These figures are nearly double those of other Western European maritime fleets[4] Foreign fleets prefer to communicate

directly with their own national radio stations. however the facility of Radio Portishead is being used increasingly by other nations



The age distribution of the federated personnel at sea is indicated in fig f The cumulative percentage distribution by age is shown in fig 11. Eighty per cent of this seafaring population is under the age of 45 The comparable figure of age distribution for the general population is 55 Eighty per cent of Royal Naval personnel are below the age of 32 [5]



Turnbull[4] noted that all federated seafarers have medicals on entry and re entry These examinations are repeated at five yearly intervals up to the age of 40 and are then biennial These intervals between routine medicals are longer than in other Western European fleets but a survey of medical severances under a GCBS scheme for the years 1972 to 1976 showed that the majority of diseases do not become apparent until the fifth decade of life There are of course exceptions such as Hodgkin's disease and testicular tumours.

Statistical significance of cases

The validity of the figures is thrown into doubt by the difficulty in ascertaining the definitive diagnosis The patient is not examined by a doctor and the majority of any follow up calls from the ship after the emergency has passed are of a Bravo Zulu nature neglecting to give any firm details of the final diagnosis

At times analysis of the figures is difficult when the notes fail to record the case adequately

In this type of medicine a positive imagination is required to lift the doctor from one end of the telephone to appreciate the full clinical picture and the consequences to the ship and its crew at the other On review of the notes, however it is obvious that one medical officer's imagination regularly took flight with a vogue of elaborate diagnoses and treatment being apparent for his term only This effect is however offset by the time and number of medical officers involved in the survey

Fig 11A shows that analysis of the 282 cases is significant The individual cases can be recorded clearly by systems even if the final diagnosis within the system is not known

The significance is shown by the agreement on the highest incidence between the survey figures for digestive system diseases and those of the In patient Enquiry by System for males in England and Wales in 1974,[6] and the figures from analysis of CIRM case load by system (fig 11C)

Part of the importance of the survey even with its limitations lies in the fact that the GCBS have found it difficult to marshall morbidity figures for illnesses at sea from their federated companies due to the repeated failure of the companies to submit details worthy of analysis

Scrutiny of the diversity of tentative

Fig IIIa
MEDICO PORTISHEAD (Total cases 282)
PERCENTAGE TOTAL CASES
BY DISEASED SYSTEM

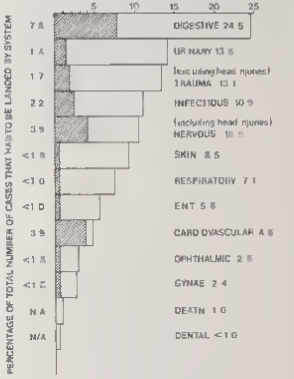
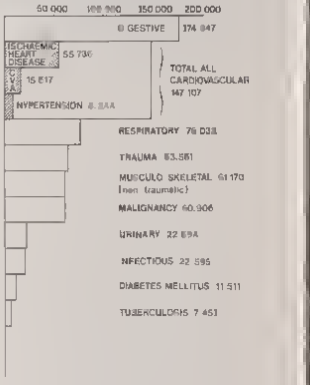


Fig IIIb
ESTIMATED NUMBERS OF DISCHARGES BY SYSTEM FOR MALES ENGLAND & WALES 1974 IN PATIENT INQUIRY (Total all causes 1 030 350)



diagnoses achieved in the 282 cases suggests some significance the nature of the illnesses being consistent with a mixture of patients presenting in general practice and in a general hospital casualty department but liberally salted with a maritime element e.g. spine of dragon fish in finger, gout renal colic, dental abscess crushed pelvis torsion testis alcoholic gastritis infective hepatitis pilonidal abscess foreign body in eye headaches paediatric group sea sickness etc

The figures for in patient discharges (fig IIIB) are only of limited value for comparison due to the population age differential all the personnel at sea had been screened to exclude diabetes epilepsy and chronic illnesses

In the in patient enquiry the patients who were admitted and discharged had already been screened by a general practitioner or casualty officer The medical statistics unit of the Office of Population Censuses are unable to provide details of the diagnosis of those patients attending a GP s surgery for comparison

Maritime personnel are effectively working in a heavy industrial environment with all its attendant risks hence the higher number of trauma cases The high number of PUOs when compared with NHS discharges must be seen against a background of foreign travel

The high incidence of urinary problems is not consistent with Royal Naval statistics[7] but the 80% population index pointed to a significant age differential [8] It is however consistent with the CIRM analysis for 1978

In order to increase the statistical value and care of the patients in the future a new card is being prepared for reporting cases which it is hoped will appear in the new

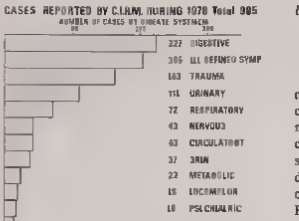


Fig IIIc

Ship s Captain s Medical Guide

To help overcome the lack of follow up and firm diagnosis the Portishead 'Medico doctor can now be contacted by telex using the telex code FOR RNH Plymouth — GENMAN 45228

Detailed Review of *Cases* by System in Decreasing Order of Incidence

Digestive System

Total number of cases 69

Percentage of all cases 24 5%

Percentage of total landed 7 8%

Diseases of the digestive system formed the largest group of cases approximately a quarter of the total, and also formed the largest proportion of cases that required landing Dyspeptic symptoms predominated including four cases of melaena four cases of haematemesis and one perforation There were two cases of alcoholic gastritis Nine cases of acute appendicitis presented, some of which were managed conservatively but most were landed due to proximity of medical facilities There were seven cases of biliary disease

Urogenital System

Total number of cases 39

Percentage of all cases 13 8%

Percentage of total landed 1 4%

This group provided the second largest number of cases of which 11 were renal colic There were four cases of acute retention of urine three of which were catheterized Although there were few specific calls relating directly to venereal diseases their sequelae were reported orchitis prostatitis and chronic dysuria Few cases were landed from this group they include a solitary case of protracted renal colic an acute retention of urine an orchitis and a torsion of the testis

Trauma (excluding head injuries)

Total number of cases 37

Percentage of all cases 13 1%

Percentage of total landed 1 7%

This formed a sizeable group and included some nasty injuries following falls or crushing There were five cases of acute low back pain Suturing was recommended for five lacerations The necessary skill for the application of 'Tobruk' plasters or plaster of Paris back slabs and splints was requested on numerous occasions All plasters recommended were to be well padded and split along their entire length down to the skin Alcohol played a frequent part in the causation of accidents and ensuing injuries

Infections and pyrexia of unknown origin

Total number of cases 37

Percentage of all cases 10 9%

Percentage of total landed 2 1%

These cases proved the hardest on which to give a meaningful diagnosis A thorough examination and time to await events would have produced a higher diagnostic yield in a general practice setting The ten cases of malaria may be hard to believe nevertheless the majority of these individuals had visited endemic areas without adequate prophylaxis either taking no drugs at all or an insufficient dosage or for an insufficient period after leaving the

endemic area Seven patients were landed one PUO four malarias and two typhoids There were two cases of jaundice in separate ships. The prevention of infectious diseases abroad depends largely on adequate health education

Nervous system (including head injuries)

Total number of cases 30
Percentage of all cases 10 7%
Percentage of total landed 4%

The inclusion of head injuries in this category distorts the figures There were 12 head injuries of varying severity five of which were landed Formulating a diagnosis on the remainder of this group was also difficult being normally dependent on skilful clinical examination Several of the conditions reported here suggested a link with alcohol abuse two mental breakdowns, two delerium tremens, two cases of sudden onset of areas of peripheral sensory loss and paraesthaesia The cases landed excluding the head injuries mentioned above were status epilepticus a left Bell's palsy and a cerebrovascular accident associated with hypertension Where the doctor s diagnosis was uncertain, landing was recommended more frequently One of the three deaths reported was a severe head injury following a fall

Skin

Total number of cases 27
Percentage of all cases 9 5%
Percentage of total landed 1 %

The only case landed was a serious burn Skin rashes proved difficult to diagnose apart from attempting to exclude systemic ill health one was aware of giving rather lame advice Twelve abscesses needed lancing It was felt that the officers enquiring were seeking encouragement before operating

Respiratory

Total number of cases 20
Percentage of all cases 7 1%
Percentage of total landed 1%

The incidence of respiratory problems reported was not as high as might be expected although a proportion of the PUOs would probably have been respiratory in origin The only patient landed from this group was severely ill with haemoptysis and pleuretic pain The diagnosis postulated was a pulmonary embolism but in the absence of a chest examination this was difficult to substantiate and could have been a severe pneumonia There was only one case of asthma and that was associated with a respiratory tract infection A solitary case of inhalation injury was reported Meaningful definitive diagnosis was difficult in this group There was a solitary case of paediatric croup

ENT

Total number of cases 16
Percentage of all cases 5 7%
Percentage of total landed Nil

Four cases of what to a doctor is a relatively simple condition tonsilitis were reported although one patient did develop a quinsy Surprisingly few cases suggesting a diagnosis of otitis externa were reported Several ships were operating in the tropics Chronic sea sickness is a real entity in maritime medicine with a possibility of death from oesophageal rupture Three cases of severe sea sickness were reported In view of the frequent prescription of penicillin it is salutary to note that one such injection was complicated by a possible penicillin reaction with angioneurotic oedema of the tongue

Cardiovascular

Total number of cases 13
Percentage of all cases 4 6%
Percentage of total landed 4%

Eleven out of the 13 patients were landed this was by far the largest proportion in any one group One of the three deaths reported was preceded by chest pain These cases proved difficult to diagnose with any certainty which is reflected in the highest landing rate and is justified by the high mortality associated with initial myocardial

infarctions and angina

The total number of cardiovascular cases reported must be a slightly smaller proportion when compared with the figures for the general population due to the medical screening of seafarers

Ophthalmological cases

Total number of cases 9
Percentage of all cases 2 8%
Percentage of total landed 1%

One penetrating wound of the left eye was landed All but one of these ophthalmic cases were traumatic either foreign bodies or acid/alkali burns During silent hours the Medico sought specialist advice on the management of one of the acid burns

Gynaecological cases

Total number of cases 7
Percentage of all cases 2 5%
Percentage of total landed 1%

All the cases involved vaginal bleeding possibly associated with pregnancy except in one instance where an established pregnancy was complicated by a urinary tract infection All the calls were from merchant ships and not passenger liners Wives at sea run a risk of falling pregnant with the attendant hazards of the first trimester

Two paediatric problems were reported Children are notoriously difficult to assess and medical scales are not equipped for their care unless specially supplemented Should wives and children travel at sea on ships without a medical officer?

Dental

Total number of cases 2
Percentage of all cases 1%
Percentage of total landed Nil

Two cases were reported an abscess associated with a lower right canine tooth and a bleeding socket the sequel to an extraction in port Deck officers and doctors caring for seafarers should be prepared to render dental first aid

Deaths

Total number of cases 3
Percentage of total cases 1%

There were three frantic calls but all were sadly overtaken by events leaving the Medico feeling like an impotent bystander a secret voyeur on a distant tragedy The three deaths a severe head injury after a fall chest pain (presumably a massive myocardial infarct) and a coma of unknown cause preceding death served to underline the hazards of life at sea It is probable that these patients would have died even if a general hospital had been only a cable's length away Such calls as these served to remind us of the ultimate significance of Medico work

Details of Cases Landed

Out of 252 cases the doctor advised the landing of 67 (approximately one quarter) The majority of patients landed were suffering from diseases of the gastrointestinal tract such as appendicitis and the complications of peptic ulceration

The decision to land a patient was influenced by the proximity of the ship to suitable emergency services or to a port

Eleven out of 13 cardiovascular cases were landed the highest proportion of cases in any one category They involved various degrees of ischaemic cardiac pain The second largest proportion landed were the neurological cases which included five head injuries out of a total of 30 cases reported Alcohol contributed directly to two patients being landed one with delerium tremens and the other with a severe mental disturbance Six fever cases were landed to facilitate accurate diagnosis and definitive management Five trauma cases were landed all but one after major falls

Without Medico' advice there is little doubt that a greater proportion of cases would have been landed unnecessarily and other cases endangered by being misassessed on the ship The Medico advice made a positive contribution to the

management of the severely ill patient during time on passage until making a landfall thereby giving him his best chance Frequently one felt that the Master was seeking a medical opinion to confirm his decision on management and to share the potentially costly decision of whether or not to divert

'Medico' Doctors

Most of the casualty medical officers answering the Medico calls have at least two years' experience of maritime medicine in the Royal Navy and are in a training scheme such as surgery medicine or GP vocational training Consultants in all the major specialties are available for back up and in depth advice

Not one ship s doctor used the facility for consultant advice during the survey period

The duty casualty officer at RNH Plymouth who handles the Medico calls is resident in this busy casualty department and is immediately available for all emergencies, 24 hours a day The waiting time for the ship originating the call is therefore minimal

Deck Officers

The request for medical advice comes from a deck officer navigator radio officer or ship s Master This is usually in English on a telegram read by the Portishead radio operator One quarter of the calls are on the radio telephone the majority on surprisingly clear lines

The medical training required of Masters and deck officers is laid out in the Department of Trade Merchant Shipping Notice [3] Turnbull[4] commented that the United Kingdom was lagging behind most other countries in its medical training for ship's officers

The syllabus is based on the Ship's Captain s Medical Guide[1] and associated Department of Trade drug scales and is in theory adequate In our experience very little time was wasted on explaining the basic medical facts to assist in the patient's assessment and management In view of our experience some dental first aid and tropical hygiene could be added to the syllabus.

Table III reviews and compares the skills required of the 'Medico' doctor with those of the deck officer

Radio Portishead Telegraphists

The radio and wireless telegraphists made a significant contribution to the service intercepting and translating calls so that they were mutually comprehensible In my experience they have been tireless in their assistance to make the service run smoothly re-establishing poor R/T lines deciphering medical terms into common English offering advice on the position of the ship drawing on their own maritime experience for radio and medical assistance in the immediate vicinity of the ship

The Ship's Captain's Medical Guide

This is an excellent book well founded in maritime medical experience The 1940s pictures and some outdated minor aspects of management indicate that the new edition being prepared should render it even more acceptable and dependable The diagnostic charts are excellent More colour prints of the common skin conditions and rashes would be helpful

Drugs

The medical scales

The medical scales laid down in The

Merchant Shipping (Medical Scales) Regulations 1974[8] were quite comprehensive and relevant leaving no major gaps in the maritime therapeutic armoury From experience of the drugs prescribed by the Medico the interesting feature was the major dependance on four drugs (1) penicillin (both oral and intramuscular) 33 and 41 respectively total 74, (2) morphine IM — 42 (3) aspirin tablets — 35 (4) tetracycline — 20 It is therefore important that stocks of these drugs are adequately maintained on board

A problem that occurred time and again was the failure of the ships to use the approved names of drugs In this country alone tetracycline has nine different names [9] Add to this the trade names for oxytetracycline and then the trade names for tetracycline bought on local purchase abroad or carried on non UK registered ships and one can see the time wasted looking through Mimms and Data Sheet Compendium whilst on a radio telephone call to the South Atlantic

Certain minor revisions of the scales are needed in the light of experience and recent trends in therapeutics

Analgesics Pethidine 50 mgs ampoules for IM injection should be available in Scales I and II to assist in the management of renal colic

Antacids Cimetidine preparations may be indicated in the management of duodenal ulcer recurrent ulcer after vagotomy gastric ulcer reflux oesophagitis some acute gastrointestinal haemorrhages Zollenger Ellison syndrome The value of cimetidine and its indications are reviewed by Milton Thompson[10] and Burland *et al* [11] In view of the large number of dyspeptic patients encountered in the survey and the proportion that had to be landed (including four with haematemesis and four with melaena) and despite its cost oral cimetidine should be included in Scales I and II An intramuscular preparation should be added when available The use of cimetidine should be restricted to appropriate indications and full courses and should not be available on demand Cimetidine forms an important *addition* to the drugs in the armoury for the management of dyspepsia but should not *replace* the traditional antacids dispensed from the sick bay

Antibiotics Penicillin rightly remains the drug of first choice in the majority of cases However due to the lack of erythromycin and cotrimoxazole tetracycline became the second drug of choice in the majority of cases when a penicillin allergy was reported Tetracycline is only a bacteriostatic drug despite its wide spectrum and its use should be reserved to preserve its effectiveness [12] Oral cotrimoxazole erythromycin (oral and IM) and ampicillin (oral) could be added beneficially to Scales I and II for their stronger therapeutic effect as alternatives to tetracycline Metronidazole suppositories should be added to Scales I and II to assist in the management of infections due to anaerobic organisms in cases of acute appendicitis and perforations

Anti emetic Promethazine is only available in tablet form and therefore its use is limited as an anti emetic Whilst it is true that chlorpromazine is available by injection, promethazine by injection would be useful in an anti allergic setting As an anti emetic cyclizine suppositories could prove useful as an alternative to an injection

Anti inflammatory Phenylbutazone has largely replaced colchicine as the drug of

first choice in that common condition of sailors — gout There is no specific treatment for gout in the Scale II drugs

Sedatives and tranquillisers CURB S recent endeavours suggest the withdrawal of butobarbitone from the scales although phenobarbitone must be retained as an anti convulsant Diazepam could be added to Scales I and II in both oral and IM preparations as an alternative

Broncho dilators Aminophylline injection is the only broncho dilator and that is only available on Scale I Aminophylline suppositories could be added to both scales and backed up with oral salbutamol Although asthmatics are screened from seafaring [13] shipboard fires produce toxic fumes which are intensely broncho constricting

Appliances No plaster of Paris is available in Scale II

Nasogastric tubes The temptation to advise the passage of a nasogastric tube was often great but nasogastric intubation should only be used under the supervision of a medical officer on board ship when intravenous fluid replacement can be given In the absence of a medical officer it would probably be safer to place the patient on a strict nil by mouth regimen

When children are carried special provision should be made by taking on board appropriate paediatric preparations This proved a problem on two occasions

Rectal insertion of suppositories is a very good method of administering certain drugs when the oral route is inappropriate and does not have the hazards of injection Rectal administration of fluids is safe provided water intoxication is avoided

Discussion

From epidemiological information on the annual incidence of dyspeptic symptoms in a general practice of 2 500 patients it is possible to predict the annual incidence amongst the 75 000 federated seafarers [14] (Table V)

Day[14] also reports that certain diseases are more likely to occur in persons who suffer from duodenal ulcers

1 Coronary artery disease — twice as likely

2 Chronic bronchitis — twice as likely

3 Pulmonary tuberculosis — five times as likely

4 Significant psychoneurosis — three times as likely

The sailor's stomach has been well reviewed by Watt[5] who found the following factors responsible for a high incidence of peptic ulceration

1 The mercurial personality of those attracted to a sea going life

2 Operational conditions associated with tension responsibility and manpower shortages

3 Lack of exercise

4 A diet rich in refined carbohydrate

Cleave[15] has advanced his theories of the saccharine disease considering that the removal of the protein component of carbohydrate foods and loss of bulk fibre results in a reduction of buffering power which allows unbuffered acid to bathe the duodenum during the post prandial period It is interesting that the mechanical milling of grain only started in the latter half of the nineteenth century The mechanical milling produced white flour with a higher extraction rate of fibre thus resulting in a diet of low residue with increased sugar intake [15]

Dietary aetiology is associated with many diseases of the twentieth century heart disease obesity varicose veins constipation diverticular disease Acute appendicitis was virtually unheard of before the nineteenth century the first case being described in the 1880s

In a review of patients with urolithiasis Blacklock[16] found an incidence of proven peptic ulceration of 7% which was vastly in excess of the incidence of peptic ulceration in the Royal Navy as a whole It is perhaps noteworthy that over 200 of his 534 subjects were overweight Blacklock[16] also identified the stone formers to be obese and in sedentary occupations with an increased incidence amongst those serving in the tropics It therefore follows that in the tropics and in hot machinery spaces large volumes of alcohol mixer drinks and soft drinks are not the correct substitutes for water as they enhance the possibility of stone formation

With the passing of the pressgangs and maritime malnutrition today's sailor, finding himself in a multichoice cafeteria picks the attractive foods rich in carbohydrates [17] Morris et al[18] found that in patients with urolithiasis ingestion of solutions of refined carbohydrate such as beer produced after a short delay a tide of increased urinary calcium excretion

Marjot[19] found that problem drinkers had a poorly balanced diet were obese were involved in more accidents and were prone to depression and anxiety Jarman and Kellett[20] found that on review of admissions to a district general hospital there was a disproportionately high number of hidden problem drinkers presenting with drug overdoses coronary thrombosis sundry medical conditions and a multiplicity of orthopaedic injuries Soft water stress smoking obesity and lack of exercise go hand in glove with coronary insufficiency and a high at risk profile for ischaemic heart disease

Obesity is associated with gout varicose veins hernias skinfold infections bronchitis hypertension osteoarthritis psychiatric problems etc

Cigarette smoking in excess of ten per day increases the risk of ischaemic heart disease lung cancer, peptic ulcers bronchitis and peripheral vascular disease

In the face of this evidence the sailor appears to be especially vulnerable to preventable ill health

Prevention

Medical standards should be strictly enforced Safety hats harness goggles and footwear should be worn guard rails should be fitted and deteriorating eyesight monitored Tables could be introduced into the medical standards indicating acceptable weight ranges for age height and build

The gut reaction of most sailors to health education is summarised aptly in D. G Rossetti s poem

My doctor s issued his decree
That too much wine is killing me,
And furthermore his ban he hurls
Against me touching naked girls
How then? Must I no longer share
Good wine or beauties dark and fair
Doctor Goodbye my sail s unfurled
I m off to try the other world

The Future. 'Computer Medico'

Work by Gunn in Scotland[21] showed that carefully structured case notes improved the diagnostic accuracy of abdomtual pain in a casualty department from 55% to 78%. Wheu the same data from the case notes was fed into a computer the correct differential diagnosis was achieved with 10% more accuracy Use of the structured case notes also reduced the incideuce of unnecessary laparotomy from 18% to 7%

In an article on computer assisted diaguosis of dyspepsia in 360 patients at Leeds Zoltie Horrocks and De Dombal[22] achieved an overall accuracy of 73.3% The

computer correctly diagnosed 14 out of 18 gastric carcinomas at the expense of only three false positives These diagnoses were based on the history alone This work suggests that if as much care went into eliciting the clinical history on the R/T as went into preparing the software of the computer Medico's diagnosis could become less vague and thus reduce the number of ship diversions to land patients unnecessarily Ships linked by telex to a Medico computer may not be too far away

Summary

It is alien to a doctor to offer diagnosis and management without seeing the patient This survey indicates the positive contribution that can be made to maritime medicine by an astute Medico Royal Naval medical officers are particularly suited to this work but they only form part of a team involved in the care of those who fall ill at sea It is to be hoped that some of the recommendations which emerge from this review will be of help to those immediately concerned in determining the standards and scales and those overseeing the training by which sickness and death at sea are minimised

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The Management of Rescued Shipwreck Survivors

F St C Golden

ABSTRACT

A ship's medical officer may be called upon at any time to attend to casualties from a shipwreck. This paper outlines some of the common problems which may be encountered in such a situation and [illegible] a possible course of procedure.

Introduction

In peacetime warships are frequently called upon to coordinate the search and rescue of shipwreck survivors. Ships medical officers are expected to be instant experts on the management of such survivors. Unless one has given the matter some thought in advance the drama of the occasion may catch one unprepared and result in unnecessary loss of life.

While in transit to a stricken ship it is advisable if possible to ascertain the nature of her cargo. A large variety of toxic chemicals are currently carried by a number of cargo ships — not always necessarily designated chemical carriers. The chemical containers may be damaged in the incident leading to the shipwreck thereby creating a chemical hazard of known entity or in the case of mixtures (cocktails) unknown entity. Closed circuit breathing apparatus and specialised clothing together with other precautionary measures may therefore be necessary.

Rescue Techniques

Survivors may be rescued from the parent ship, the water or from boats or survival craft. Those rescued from the water or from boats are frequently too weak to assist in their own recovery or have injuries which prevent them from doing so. In either event [illegible] arrangements [illegible] during [illegible] Some [illegible] Man handling [illegible] are frequently [illegible]

During the [illegible] World War II the special rescue ship [illegible] to convoys had scramble nets rigged along the sides and attached [illegible]. These nets could be [illegible] the boats [illegible] under [illegible] in the well deck [illegible] baskets [illegible] could be [illegible] lifebelts [illegible] could be thrown to men in the sea.

The [illegible] of the [illegible] are highlighted by the following extract by Sir Arthur Salisbury MacNalty[1] the official historian of the Medical Services at sea (World War II)

> *... commonly many survivors who had managed to get themselves to the point of being helped from the sea collapsed when aid was within reach and required to be handled in the same manner as those who had been helpless while still in the water.*

Indeed there are numerous anecdotal stories of survivors attempting to climb up the sides of the rescue ships only to fall back into the sea and be lost. Whatever the precise physiological mechanism of the collapse of such survivors during rescue it is tragic to come through such an ordeal only to be lost when salvation is at hand.

Every effort should therefore be made in advance to prevent such a tragic outcome. If lifting nets or baskets are not available then weather permitting the ship's boat or life raft may be used as a suitable platform into which the survivors may be rescued before being recovered inboard. This avoids a vertical lift in a strop which is not advisable for hypothermic survivors, i.e. victims who have been immersed for 30 minutes or more in cold water. However, despite advance planning there will be occasions when it is necessary to recover survivors by any means practicable in the conditions.

Triage of Survivors

An easily accessible sheltered compartment on the upper deck should be chosen in which to make a cursory examination of survivors as they are rescued and decide on disposal and priorities for treatment. Clinical conditions requiring management will vary from mild acute hypothermia to drowning in immersion victims, and from chronic hypothermia to dehydration/malnutrition in those rescued from survival craft. In addition, some survivors may be suffering from burns or traumatic injuries while those rescued from the water will frequently be contaminated with oil with local effects to eyes, lungs and stomach.

It is important to remember that many hypothermic casualties collapse and sometimes die on or shortly after rescue (vide infra). For this reason survivors should not be required to climb down ladders to treatment centres. The nearest easily accessible sheltered area should be used for triage.

The Immersion Victim

For the purposes of initial management no attempt will be made to differentiate between survivors suffering from hypothermia or drowning. Such disunctions are artificial and unnecessary at this stage. It is advisable to assume that all survivors are suffering from hypothermia and drowning to a varying degree until proven otherwise. Initial treatment is therefore the restoration of adequate ventilation and circulation with prevention of further heat loss.

All personnel involved in the rescue should be aware of the necessity to maintain an adequate airway, prevent postural hypotension and provide adequate insulation. The importance of speedy and persistent resuscitative efforts should also be emphasised during first aid instruction. In addition first aid students should be warned that about 60 per cent of near drowning victims vomit during resuscitation. The proven value of expired air resuscitation over other methods of non mechanical artificial respiration should be emphasised as should the possible requirement for some intermittent positive pressure ventilation for those victims who are breathing spontaneously but who are cyanosed due to some intra-pulmonary shunting. Conscious patients should be encouraged to cough and take deep breaths. One hundred per cent oxygen should be administered initially as a significant degree of hypoxaemia may be present in an alert patient when other obvious signs of hypoxia are absent.

Acute hypothermia

Survivors who do not show overt signs of ventilatory problems but appear to be hypothermic — shivering, confused semi-conscious or unconscious — should be rapidly rewarmed in a hot bath (41°C hand hot) if facilities are available. The patient should be immersed fully clothed the clothes being cut off whilst in the hot water.* Arms and legs should be immersed

**The identification of casualties and dead is always a problem and care should be exercised when removing and disposing of their clothing to avoid the loss of vital documentary evidence. At least one individual should be delegated to keep an accurate log of all casualties clothing etc.*

and the patient should remain in the bath until he subjectively feels warm He should not be permitted to remain in the hot water until he starts to sweat After leaving the hot bath he should be placed in a warmed bunk and insulated with blankets During rewarming he should be given warmed sweet drinks but no alcohol

Should a hot bath not be available conscious shivering survivors may be placed in warm showers but attendants must be watchful for postural hypotension If there are a large number of cold survivors a liferaft from one's own ship — placed in a sheltered position on deck — could be used as a receptacle for hot water Unconscious hypothermic victims should not be placed under hot showers but should be wrapped in blankets and permitted to rewarm spontaneously

There is no specific treatment for acute hypothermia other than rewarming Cardiac arrhythmias frequently seen at temperatures below 33°C usually revert to normal on restoration of normal core temperature

All survivors especially those who have been through a particularly harrowing experience will require some light sedation for the first few nights following the incident

Complications The major complication one should watch for is sudden collapse on or within 15 minutes of rescue This is sometimes associated with cardiac arrest probably from ventricular fibrillation The precise mechanism is not certain At one time it was believed to be associated with the 'after drop' — the continued fall in core temperature after removal from the cold water This in turn was believed to be due to the continued return of cold blood from the periphery Recent work[2] has however shown the after drop to be a physical rather than a haemodynamic phenomenon and the cause of post rescue collapse is more likely to be related to hypotension and a fall in cardiac output[3] Whatever the mechanism of post rescue collapse care should be exercised in the management of these patients especially during the early phase of rewarming

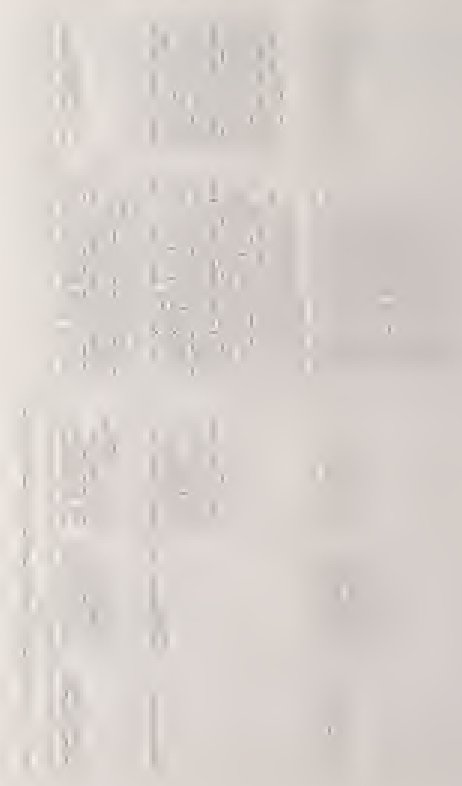
Drowning

All immersion cases who have inhaled water should where possible be admitted to hospital for assessment Even those who initially appear to have made an uneventful recovery from their ordeal may subsequently develop an acute pulmonary oedema within 15 minutes to 72 hours later[4] The onset of this so called secondary drowning is normally heralded by hypoxia tachypnea tachycardia a fall in pulse pressure and then in overall blood pressure followed by a rapidly increasing pulmonary oedema and the expectoration of pink frothy sputum The return of coma is a serious sign indicative of a poor prognosis

In the majority of ships only basic first aid will be possible In larger ships however, facilities for more sophisticated treatment will be available The important features of such management are outlined in Table I where for clarity the patients have been classified in three broad categories[5]

Steroids Opinion on the value of steroids in near drowning is divided Animal experimental evidence suggests that they do not appreciably alter the incidence of secondary drowning However the danger of cerebral oedema may in itself be regarded as an indication for the early administration of steroids

Antibiotics As with steroids opinion is divided on the value of the routine administration of a broad spectrum antibiotic The general consensus of opinion is that it appears to be a wise precaution especially if there is a likelihood that the drowning medium may have been polluted Ideally aerobic and anaerobic culture of



bronchial secretions should be performed to isolate any unusual organisms that may be present.

Diuretics. Diuretics are frequently given in an attempt to reduce the pulmonary oedema seen in near drowning. They are unlikely to be of value since the oedema is not secondary to raised left ventricular pressure and could accentuate the already depleted intravascular volume.

Complications. Cerebral oedema is a frequent complication of near drowning and should always be considered in cases where the response to treatment is delayed. If cerebral oedema is present then it may be beneficial to maintain the patient's core temperature between 30–33°C in addition to giving steroids. Pulmonary infection may occur if the water was polluted. Renal failure has been reported in some cases. This is believed to result from tubular damage secondary to hypoxia and hypertension. Renal tubular function should therefore be assessed by monitoring urinary output and the urine/plasma osmolarity ratio.

Many victims of drowning who have been successfully resuscitated gradually recover and die in the succeeding days from a progressive hypoxia. The condition, similar to the respiratory distress syndrome may be a consequence of the prolonged oxygen therapy or more likely the original insult to the terminal airways and alveolar membrane. It would appear that the early institution of positive end expiratory pressure (PEEP) reduces the incidence of this late complication.

Electrolyte changes following fresh and salt water drowning are largely of academic interest. The volume of water necessary to produce significant changes in serum electrolytes is usually considerably more than that required to produce irreversible drowning.[6] However, some changes may be found in young children suffering from near drowning following immersion in [illegible] water.

Oil Contamination.

Shipwreck survivors are frequently covered in oil and may have swallowed or inhaled some. Oil has negligible systemic toxicity although if swallowed it may cause vomiting. If inhaled it may produce an aspiration pneumonitis. In the eyes it will produce conjunctivitis which may last for several days.

Initial cleansing of oil from the hair and the mouth, nose and eyes is all that is required. The rest can be left until the patient is admitted later when time permits. This is best achieved by standing the victim under the shower removing all clothing and gently wiping with cloths or paper towels to remove excess oil from the skin. Hair shampoo and mild soap may then be used and specialised skin cleaners such as Swarfega will deal with any obstinate patches but solvents and scouring compounds and specially designed for use on the skin should be avoided.[7] The eyes may be cleansed with liquid paraffin followed by a topical steroid to relieve the conjunctivitis.

The Survival Craft Survivor

Dehydration and malnutrition are unlikely to be problems for survivors adrift in tropical waters. In temperate and sub-arctic waters castaways will probably succumb to the effects of cold long before dehydration and malnutrition become important.

Chronic Hypothermia.

People who have been hypothermic for a period of six hours or more are said to be suffering from chronic hypothermia. The difference between chronic and acute hypothermia is chiefly one of nutrition in the circulating blood volume. The prolonged intense peripheral vasoconstriction is physiologically compensated for by internal intercompartmental fluid shifts

and increased nrinary ontpnt — cold dinresis A sndden restoration of body temperatnre without a concomitant increase in circnlatory flnid volnme will result in rewarming collapse and frequently cardiac arrest A slow rewarming with flnid replacement (1 litre Dextrose 5%) will help a redistribution of body fluids without collapse Over zealous intravenous transfnsion may on the other hand overload the central circnlation Overall the optimal method of treatment is to lay the patient down in a moderately warm compartment (circa 21°C) wrap him in blankets and by varying the amount of insnlation used allow him to rewarm at about 0 5°C per honr Ideally the limbs should not be as well insulated as the torso This has several advantages it slows the rate of rewarming it conserves the cardiac output to the more essential vascnlar beds in the torso and as the majority of these cases will also be snffering from some degree of peripheral cold injnry It permits rewarming of these peripheral parts at the optimal slow rate Flnally it permits intermittent monitoring of blood pressure without distnrbing the insnlation to the body as a whole If shivering is intense oxygen should be adminstered Conscious patients should be given hot sweet drinks

Freezing cold injury (frostbite)

Frostbite may occasionally be encountered in survivors who have been exposed to wind and sub zero ambient temperatnres The symptomatology is pale indnrated- anaesthetic patches on the cheeks the tip of the nose the ear lobes In more established cases whole digits or parts of limbs may be frozen solid

It is generally agreed that the best treatment for established frosthite is rapid rewarming in agitated water at 42°C Partially thawed lesions (i e tissues no longer fully frozen haemorrhagic blistering) should be managed as non freezing cold injnries by elevation in a gentle air cnrrent at 20°C Sott dry absorbent dressings should be placed between the digits Analgesia mnst be given dnring the rewarming phase great care being taken not to tranmatise the damaged tissue and antibiotic cover is recommended Under no circnmstances shonld surgery be contemplated even in the most gangrenous tissues althongh blisters may be incised fnll sterile precautions being observed Usually only the superficial tissnes are gangrenous and will eventnally slongh off without interference Efforts to hasten separation are contra indicated and may lead to infection with fnrther loss of tissne and delay in healing The prognosis even for the most nnlikely cases is surprisingly good but susceptibility to subsequent cold injnry is increased

Non freezing cold injury (immersion foot)

Survivors who have been adrift for several days in temperate or sub arctic waters will in all probability be suffering from some degree of non freezing cold injury The skin of the affected part is nsually pale or mottled in appearance on rescue- bnt qnickly becomes hyperaemic after resene and remains so for hours The affected part feels nnmb and heavy althongh in mild cases tingling pains will occur on rewarming In more severe cases there will be some peripheral anaesthesia and in bad cases there will be loss of joint position sense Oedema may be severe and extend np to the knees The peripheral pnlses are nsually absent and capillary filling is very sluggish The skin is macerated and susceptible to severe damage from relatively minor trauma

In mild cases the pnlses will be full and bonnding while the initial hyperaemia will disappear within hours There may be no anaesthesia or other nervous symptoms at this stage bnt these may appear in five to ten days when the patient may complain of pain

in the affected limb while in bed at night If so there may be some oedema and pain on weight bearing making walking difficult The peripheral pulses usually feel normal but there may be differences in skin temperature between feet

Treatment of mild cases in which there are good peripheral pulses but no gross oedema is to encourage early ambulation Treatment of severe cases should be conservative until sufficient time has elapsed to permit accurate assessment of whether surgical interference is necessary Initially great care should be taken to prevent infection and not to damage the extremely macerated skin The limbs should be elevated and exposed to cool room air (20°C) preferably with a gentle air current from an electric fan The trunk may be actively rewarmed as required Broad spectrum antibiotic cover is advisable and steroids may have some value in the early oedematous phase but in established cases may delay nerve regeneration Dry absorbent dressings should be placed between the toes and pressure on the heels relieved

Several hours after rescue a reasonably adequate circulation begins to return to the injured region and this is accompanied by severe pain for which analgesics may be required The recovery tends to move down the limb and the skin over the recovering area usually becomes hot and red Peripheral pulses are full and some arteriovenous shunting may occur In severe cases blistering and gangrene may occur at this stage If the injured regions have been actively rewarmed then the oedema may burst through the skin and the likelihood of gangrene will be increased If peripheral pulses are absent six to eight hours after rescue the likelihood of gangrene is high

The hyperaemic recovery phase may last up to 18 months Vascular tone gradually recovers but complete recovery is dependent on the extent of nerve damage A state of sensitivity to cold may persist for years

Dehydration and malnutrition

In cases of long term liferaft survival the survivors are likely to be suffering from malnutrition and dehydration Caution should be exercised in attempting to reverse either condition rapidly Intravenous feeding may be necessary but usually the survivor will be able to take fluids orally A light diet with minimal roughage containing sugar essential proteins and small amounts of fat is recommended for a day or two until the gastrointestinal tract has recovered sufficiently to cope with normal food A diet of beaten eggs containing sugar mixed with milk or water should satisfy the initial requirements Although malnourished survivors do not usually display overt signs of vitamin deficiency it is essential to supplement their diet during treatment to prevent avitaminosis

Conclusions

As in all disaster planning, careful forethought and preparation is necessary to ensure the optimal use of facilities and labour to relieve suffering prevent unnecessary loss of life record accurate identification where possible and maintain adequate communications The rescue and management of shipwreck survivors is no exception to this policy

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Diver Monitoring

R. R. Pearson

Introduction

In the quest for improved diver safety it has been suggested that improved monitoring would prevent many of the accidents that befall divers. This may stem from the veritable explosion in medical electronics which virtually ensures that anything that moves can be monitored. The current ability to monitor various functions in ambulatory patients may have a superficial attraction if applied to divers but it needs to be applied with both a sense of reality and of proportion. The best available analysis of diving accidents including sport military and commercial diving accidents suggests that very few could have been prevented by even the most complex diver monitoring systems. Against this background it is therefore necessary to take a dispassionate look at what is possible and what is desirable. The two areas are not the same and one must not fall into the common trap of collecting information solely for the sake of doing so in the hope that some indefinable benefit might accrue. Monitoring of divers can only give information which by comparison with established standards for physiological and equipment performance criteria may identify potentially dangerous situations.

In order to determine the limitations of both the diver and his equipment the new Royal Naval Seabed Operations Vessel *HMS Challenger* will carry the most comprehensive equipment to display and record a variety of parameters relating to the physiological response of the diver and the performance of his equipment. Whilst *HMS Challenger* will be primarily an operational vessel it will provide a valuable platform for the conduct of sea going trials of new types of diving and diving equipment. Monitoring both in real time and in retrospective data analysis will provide invaluable information which will allow confident deployment of techniques and equipment to less well controlled situations.

Diver monitoring can be divided into three separate areas which will improve either directly or indirectly diver safety and performance. These areas consist of equipment and physiological monitoring of the well diver and medical monitoring of the ill diver within a compression chamber. However before discussing these three separate areas diver communications which are the very essence of any monitoring system and which to a large extent do not fall into any of these categories should be considered.

Communications

Most commercial diving regulations require diver to surface and diver to diver/attendant communications for deep diving (i.e. deeper than 50 metres) but these communications systems often leave much to be desired in terms of legibility. Despite advances made since speech processors first became available further work is required on the intelligibility of processed speech from divers breathing oxy helium mixtures. The Ministry of Defence is sponsoring

development [illegible] ter sed speech proces sors which must be diver mounted but care is needed to avoid miniaturisation to an unnecessary degree However such proces sors will allow easier development of a matched diver borne system of microphone speech processor and loudspeaker as adequate matching of the individual components of the communications system has often been neglected for reasons of expediency or economy

Of less importance to the commercial diving industry where tethered divers predominate is the ability to establish communications both diver to diver and diver to surface for relatively shallow free swimming divers The use of through water communication transmission has its problems basically concerned with variable degradation of performance depending on underwater conditions In ideal conditions transmission distances of up to 300m are possible and in general there are no major difficulties in the use of such systems for divers working in close proximity There are cogent arguments in favour of providing all shallow free swimming working divers with such a communications system and apart from the specialised area of mine counter measures diving all other military non tethered diving would benefit from such a development

It is worth noting that communications may now be supplemented by visual display units within helmets to enable a diver using a TV camera to see exactly what information he is transmitting to the surface These VDUs allow graphic information such as plans or diagrams to be transmitted back to the diver and are of benefit in assisting diver performance.

Physiological Monitoring

The definition of physiological in terms of diver monitoring is the normal functioning of living systems Therefore physiological monitoring is either a means of confirming normality or establishing an abnormality The range of normality for certain functions is quite large and may be difficult to establish in certain situations or for individuals Heart rate is an example As with airline pilots and others exposed to stressful situations divers often have very high pulse rates albeit for short periods These rates are not abnormal if they are transient and it is therefore questionable as to whether heart rate is worth monitoring due to its wide variability in normal situations

A further point is that physiological information is only as valuable as the ability to analyse or display it Thus if most forms of physiological monitoring are to be of use in real time skilled analysis must be available on the surface Fortunately the Navy is able to provide such expertise and *HMS Challenger* will be adequately complemented in this respect

It is important to realise that in the majority of situations where non physiological function could be established and acted upon the diver's subjective observation would just as rapidly establish that something was wrong It is therefore arguable that a good communications system in itself provides adequate physiological monitoring

Finally it should be stressed that the comments apply to both tethered and free swimming divers for just as in communications through water acoustic telemetry is perfectly feasible for physiological monitoring In fact many functions can be monitored and such problems as do exist are mainly centred on the diver borne transducers in terms of performance sizing and comfort

Heart rate Several ways of monitoring heart rate are feasible but none are necessary as a real time aid The difficulty in deciding whether a high pulse rate is significant is really too great The reason for a zero pulse would be evident from the

presence or absence of communications Similarly electrocardiograms are quite easy to obtain from in water divers and equally valueless as a practical real-time aid to safety However in certain research situations such information may be valuable either in real time or stored for post dive analysis

Respiratory rate/respiration This is perhaps of more importance than heart rate and it is already possible to monitor the quality of respirations via good communications systems Heavy laboured breathing may imply that all is far from well with a diver However when more than one diver is in the water assessing an individual diver's respiration from the common communications system becomes unacceptable for supervisors

Respiratory rate may be assessed in a variety of ways from thermistors to pressure transducers and it is easier to give upper acceptable limits for respiratory rate than for pulse rate Real time monitoring with alarms for exceeding pre set limits is becoming feasible and should certainly be investigated for deep-dive situations where more than one diver is in the water However the current state of ability to reliably monitor respiratory rate in divers is not fully developed There is no case to be made for monitoring respiratory rate in shallow divers

Core temperature (deep body temperature) Despite the intense activity generated over the thermal status of divers monitoring of core temperature remains of arguable value It is not yet practical for routine usage and depends either on invasive rectal probes or radio-pills of dubious accuracy The Clinical Research Centre under a Ministry of Defence contract is currently investigating the various alternatives available for practical monitoring of deep body temperatures

Well documented evidence exists to show that an insidious drop in deep body temperature may be most hazardous in divers but at present monitoring should be reserved for research situations where information can be gained to ensure that the diver always gets adequate thermal protection from his equipment

There is still a great need for research into the general assessment of the diver's thermal status for the diver is of little use if despite a normal deep body temperature his hands and feet are numb with cold Such a study is particularly necessary for shallow divers where active heating is not normally available

The situation may change with the development of heated pads applied to the skin which by establishing a zero temperature gradient between the pads and the skin estimate cutaneous heat loss and correlate this with deep body temperature Further development is needed and any such device must be isolated from the influence of any positive heating applied to the diver Obviously it can only be of use in situations where there is indeed a heat loss from the core through the skin. Again they may be of greater value in research than in operational situations

Equipment Monitoring

As with physiological monitoring virtually anything is possible in the way of equipment monitoring but apart from the research situation little is either practical or valuable A brief description is given of those aspects of equipment monitoring which are commonly supposed to be of potential value

Partial pressure of oxygen in breathing mixtures and within helmets Suitably small transducers have been available for some time for monitoring of oxygen partial pressures at the diver end of a gas supply These appear attractive in being able to detect hypoxic mixtures in helmets or in gases being supplied to divers but a closer study suggests that the gas mixes should

have infallible checks at source and helmet designs should be such that they do not allow hypoxia with a correct gas supply The advent of push-pull systems which allow the atmosphere within the bell to be supplied to the diver make monitoring at the diver end superfluous At most a helmet mounted device giving the diver a visual warning of dangerously high or low partial pressures of oxygen is all that should be necessary Such a device is already available in conjunction with closed circuit constant oxygen partial pressure diving sets and its wider application should be investigated

Partial pressure of carbon dioxide in helmets This particular form of monitoring remains frustratingly elusive for remote monitoring of divers due to the unavailability of a suitable transducer It is possible in the research situation by direct gas sampling with remote analysis and for the foreseeable future this is where this aspect of monitoring will stay Research and development should provide the information to ensure that equipment will function within its design specification when taken into the field and thus obviate the need for any diver mounted device

Breathing gas temperature Where legislation or experience dictates that divers should have breathing gas heating it seems attractive to monitor the temperature of the gas on delivery to the diver Equally whilst the transducer application is very basic this form of monitoring should be left to research situations and operationally one should rely on the diver's comments An interesting sideline on work carried out in this area is that the heat exchangers normally used to heat breathing gas are often inefficient and ideal gas temperatures for various depths are rarely achieved A good deal of research remains to be done in this area

Temperature of suit heating This is a relatively simple form of monitoring but is of little use in the operational situation where a diver's subjective opinion is quite adequate What is urgently needed is the instant willingness to react to divers' opinions when there is any question of hearing inadequacy If electrically heated undergarments become a practical proposition monitoring of this nature will become equally impractical in the operational situation This having been stated however there is a continuing need to develop research monitoring systems which will allow even more comprehensive assessment of the various aspects of thermal protection of divers before they are approved for operational use

Time/depth recording Although of little significance to operational diving diver mounted time/depth recorders of acceptably small dimensions are available and have a part to play in research Depth recording devices are already obligatory in several national diving regulations (e g Norwegian Australian USA Coastguard and OSHA) to allow surface scrutiny of surface supplied divers The extension of such a requirement to commercial free swimming (SCUBA) divers would almost certainly mean the end of this form of commercial diving

Mission recorders It has been postulated that mission recorders which store information on selected aspects of a diver's physiological status and performance have much to offer in assembling information from operational divers with resultant improvements in safety and performance Although this would be technically feasible particularly with the advent of miniaturised solid state data storage devices the selection of divers to monitor and the interpretation of information gathered would prove to be a difficult and costly exercise particularly as the vast majority of dives are fortunately normal and uneventful Only if a highly selective approach is used in carefully controlled situations would mission record-

ing prove useful

Finally one development which is worth considering is the advent of remotely controlled unmanned underwater vehicles as diver performance monitors The flexibility of these vehicles when used as TV camera platforms allows the optimum visual monitoring of divers at work Although no known attempt has been made to utilise these vehicles as relay stations for other aspects of diver monitoring there may be advantages in using through water acoustic telemetry to pass information from the diver to the vehicle which would then relay it to the surface via its umbilical

Medical Monitoring

The monitoring of ill divers under pressure is a subject in itself and distinct from other aspects of diver monitoring The difficulties lie less with transducers and more with transmission of the signals generated to display recorders outside the chambers Radio and infra red telemetry which obviate the need for electrical chamber penetrations both allow a wide range of signals to be received and are perfectly practical For more general use however bearing in mind the potentially infrequent use of such monitoring hard wire chamber penetrations are satisfactory and their use can be optimised by multiplexing of information before transmission out of the chamber

Among the various functions which can be recorded are electrocardiogram electroencephalogram electronystagmogram and core temperature Such information is only of use to a physician capable of analysing and using what is displayed However the ability to monitor these functions may be of vital importance in differentiating between intercurrent illness and pressure/decompression related illnesses Such differentiation will have a fundamental importance in decisions taken such as whether to introduce medical assistance into chambers when the patient is on saturation diving mode and whether decompression procedures will need to be modified

In conclusion whilst much is possible in in water diver monitoring little is practical or necessary in the operational situation and above all it is essential to keep a sense of proportion before embarking on work or legislation in this area Conversely the monitoring of divers in diving chamber complexes for medical diagnostic purposes is important It is pleasing to report that *HMS Challenger* should be adequately equipped in both areas.

Fastnet 1979

C W Millar

SUMMARY

On August 14 1979 there was a [illegible] due to unusually ferocious [illegible] The largest recorded search and rescue operation [illegible] with aircraft from many Royal Naval and Royal Air Force airfields taking part. It was [illegible] given by the Dutch guard ship which was again aided by ships of the Royal Navy and merchantile marine. The helicopter base nearest to the scene of the incident was HMS Seahawk so all survivors were processed through Culdrose sick bay. The first yachtsman to be received at Culdrose was a Frenchman at 0930 on the last on that day a Briton at 2100. A total of 75 survivors and one body were received on August 14 one more survivor on Aug. 15 and the final two injured the following day. The greatest number delivered at any one time to the casualty entrance to the sick bay was 13 and fortunately injuries were slight only two survivors requiring immediate hospital care.

Fig 1 Training with representatives of the support units

Introduction

HMS Seahawk is the Royal Naval Air Station Culdrose situated on the Lizard Peninsular in West Cornwall. It is the largest helicopter base in Europe serving as a training establishment for many skills and trades from helicopter pilots to WRNS telephonists from heavy goods vehicle drivers to aircraft handlers. Culdrose also serves as the parent establishment to the front line Sea King helicopter squadrons and in terms of relative man hours has a minor role in search and rescue operations a role however that is widely publicised. There are approximately 2 500 male officers and ratings and 220 members of the WRNS on the base. The purpose built medical and dental centre at Culdrose was occupied for the first time a mere five years ago. It is a single storey building forming a square surrounding a central landscaped courtyard. A communal waiting area is situated between the east side of the building occupied by the dental department and the northern wing which houses the out patient department of the medical section. The west side comprises the casualty operating theatre having accommodation for duty personnel the main stores and galley. The remaining or southern side of the building forms the in patient complex with a total of 22 beds. There are X ray and limited operating facilities but pathological investigations are undertaken at the NHS laboratories at Truro.

Search and Rescue

The SAR aspect of HMS Seahawk's task is largely controlled by the Rescue Coordination Centre at Plymouth. This centre cooperates closely with the Coastguard Service the Royal National Lifeboat Institution in the West Country and the Royal Air Force stations at Chivenor North Devon and St Mawgan North Cornwall. During daylight hours Culdrose has a

Wessex V of 771 Sqnadron at immediate notice for SAR purposes bnt the Department of Trade and Indnstry committment relies npon the dnal pnrpose ASW/SAR Sea Kings of 706 or front line sqnadrons these helicopters having a noctnrnal capability and greater endnrance than the Wessex There is a flight of RAF Sea Kings on the Air Station These aircraft are purpose bnilt for SAR work and wthout sonar or weapons have an even greater endurance than the RN Sea Kings in addition to considerably more interior accommodation for casualty evacnation

The Fastnet

The Fastnet is a race for ocean going vachts held every other year and is the cnlmination of Cowes Week Valnable points may be collected towards the Admiral s Cup the race being amongst the most presligious in the world The course for the race starts off the Isle of Wight, skirts to the south of the Isles of Scilly ronnds the Fastnet Rock off Southern Ireland the yachts then proceeding by the fastest ronte to the finishing line at Plymouth

Medical Staff

On Friday August 10 1979 the personnel at *HMS Seahawk* proceeded on the three week main summer leave Dne to the longer than usnal leave period and previons experience of the SAR task the medical staff were divided intn two watches with the result that on Tnesday August 14 there were on or near the air station two medical officers one LMA three MAs one naval nnrse and one Leading Wren DSA By chance two Snrgeon Sub Lieutenants in their first clinical year were attached for training

Augnst 13, 1979

At noon on the second Monday in Augnst the Officer in Charge of the RN School of Meteorology and Oceanngraphy was bar beening in the wind and ponring rain he was protected from the elements by a home made canopy and a bottle of wine Unperturbed as the canopy took off this officer remarked casnally that this event was the result of a front passing over bnt the significance of his comment was not realised at Culdrose for a further 16 honrs, when the Rescue Coordination Centre at Plymonth informed the Air Officer of the Day that there was concern for the crew of the yacht *Magic* and later announced that another sailing vessel had gone aground on the Scillies

Fig 2. *The sea conditions*

August 14, 1979

At approximately 0535 the general alarm sonnded throughout the camp the SAR Wessex was scrambled immediately followed later by the DTI Sea King The significance of the general alarm to the sick bay personnel is that the medical officers mnst be on board the MAs shonld prepare for any occurrence or casualty who may be

flown in and the [illegible] and driver should be in readiness at the sick bay The serious nature of the situation in which the Fastnet yachtsmen had found themselves was not yet fully known at Culdrose during the next four hours news slowly filtered through to the medical staff that yachts were in difficulties and that survivors or casualties were to be expected The first yachtsman a Frenchman from the *Tarantula* arrived at the medical centre at 0930 at which time the PMO joined the duty medical officer

The Problem

Sufficient information was then available to identify the problem thus the task was to receive and appropriately cater for an unknown number of survivors over an unknown period of time The objectives were therefore to receive rewarm treat injuries document boust morale accommodate and despatch

The Undertaking

Reception was divided into two phases the first of which was entirely dependent on good communication The sick bay was informed of the imminent arrival of survivors via the direct telephone link with the tower and as far as possible the number involved and seriousness of any trauma were indicated The ambulance with one MA was then despatched to 706 Squadron hard standing half a mile away If deemed necessary from reports a medical officer accompanied the MA The second phase of reception was at the casualty entrance to the sick bay where the survivors were met by a medical officer and another MA or volunteer Those assessed as having injuries requiring immediate treatment entered the casualty theatre direct whilst the others were taken to the undressing area Fortunately only one patient had sustained injury severe enough to require immediate transfer to the nearest hospital at Truro 17 miles by road

The undressing area was the bathroom not included in the original sick bay but converted from a store and designed to be utilised in the treatment of a single case of hypothermia There with help if necessary the survivors removed their clothing, their valuables were taken to safe keeping and this completed they were shown to an individual bath elsewhere in the in patient limb of the medical centre At this stage as hot drinks were dispensed and documentation commenced or continued a degree of euphoria was often apparent amongst the bathers However with the pressure resulting from the arrival of a new contingent the jollity was sometimes short-lived a forceful request to 'move on' having to be made on occasions Pyjamas were issued and the survivors escorted to bed The documentation was then completed injuries treated valuables returned and a hot meal provided Each survivor was allowed one telephone call to next of kin except in the case of those crews from abroad when a call was made by one

Fig 3 Survivors from the Tarantula in the undressing area

crew member to a relative or an appropriate official as desired

It was soon realised that there could well be a continuing influx of yachtsmen to Culdrose and that without other action the sick bay accommodation would be overwhelmed Arrangements were made to despatch those survivors who had recovered sufficiently from their ordeal and Royal Naval coaches or minibuses were provided to transport them in the first instance to Plymouth and later to the British Rail station at Redruth Those passengers who were destitute were given sufficient money to enable them to achieve their immediate objectives A number of survivors were collected from Culdrose by friends or relatives Later in the day it was recognised that a significant number of guests would have to be accommodated on the air station overnight accommodation blocks were therefore prepared In the event one dormitory was used by foreign crews and one by crews from British yachts.

By approximately 2200 on August 14 no survivors remained in the sick bay and all beds were ready for any new arrivals In fact the next casualty arrived two days later and a further two survivors on August 17

The Survivors

All the men and the two women received at the sick bay were tired cold wet and hungry Their reaction to fatigue was modified in several instances by a form of euphoria which overcame some of the crew members Conversely there were two survivors who suffered an acute reactive depression and anxiety one had definitely lost his father and the other had lost a fellow crew member from a life raft and had no knowledge as to the remainder of the crew which had included his brother With the exception of the first arrivals the body temperature of survivors was not taken since the prevailing conditions were not conducive

Fig 4 *One of the damaged and abandoned yachts*

to scientific assessment all were conscious some were shivering whilst others just felt extremely cold A hot bath with shampoo provided improved both the physical and mental well being of all

Injuries were of a relatively trivial nature some suturing and dressings being undertaken Two patients were sent to the Royal Cornwall Hospital at Truro the first had fractured ribs with suspected pneumothorax and the second was an epileptic who had not received medication for 24 hours and who had been immersed intermittently for 12 hours On August 16 a patient who had already received first aid for a fractured mid shaft of radius and ulna was given secondary aid in the form of lunch in the wardroom before being driven to the Royal Naval Hospital at Plymouth

Communications

The success of any rescue operation especially one of the magnitude of the Fastnet disaster is very largely dependent on communications and fortunately the Culdrose sick bay is well equipped with telephone links It is also important that the press television and film crews be afforded every facility and on this occasion they responded thoughtfully and helpfully The direct telephone line between the tower and the sick bay was utilised to inform the medical staff of the time of arrival of survivors and the type of trauma if any

[illegible] in [illegible] on board. The [illegible] system was used to communicate with other departments within the establishment. Three other telephones were linked to the Culdrose exchange, one line being used for incoming calls from the press, owners, relatives and friends, another for outgoing calls from the press, and the third for the use of survivors.

Apart from the telephone system, the tannoy was used to raise the alarm and to issue situation reports, whilst the BBC radio assisted with broadcasts to recall personnel from leave.

Documentation

The L/Wren DSA was tasked with documentation of the survivors and the importance of her records was stressed. Apart from name, address and next of kin, of the survivor, a note was made of the yacht of which he was a crew member and the total number on board that vessel. This information was fed back to the Rescue Coordination Centre in Plymouth through the Culdrose control tower and was invaluable to all concerned, including the crews of the still searching helicopters — a number of yachts appeared abandoned but in the absence of a list of survivors an aircrewman would have to be lowered to inspect every apparently empty vessel.

Victualling

Food, clothing, accommodation and money all had to be provided from the stores department at Culdrose. One Petty Officer Cook and one cook provided hot meals for the survivors, the food being obtained from the main galley and cooked in the sick bay. In the midst of the turbulence of the day the galley staff provided a gluten free meal for one sufferer from coeliac syndrome!

The yachtsmen's clothing was washed and dried in the Wrens' accommodation block and duly returned. The duty Wren stores accountant helped with the provision and distribution of ratings' working clothes and shoes, additional linen was also provided for the sick bay. Those survivors who stayed the night were accommodated in the ratings' blocks, whilst those who had to use public transport for part of their journey were given financial assistance. Final rounds were carried out by the PMO and his wife, who distributed mogadon washed down with a liquid originating North of the Border!

Operation Agila — A Medical Role for the Royal Navy in Rhodesia

S S Ridout

Introduction

In December 1979 it was decided to send a Royal Naval medical team to Rhodesia This was to form part of the medical support for the ceasefire monitoring operation code named Agila The team consisted of four medical officers and five medical branch ratings and was in Rhodesia from the time of the ceasefire until the elections at the end of February 1980

The Royal Naval involvement in operation Agila came at short notice and after a few days preparation over the New Year holiday the team assembled at the Air Mounting Centre at RAF South Cerney to be kitted up for life in the Rhodesian bush This included everything from green uniform and mess tins to sun cream and deodorant It was only when a 9mm pistol was issued to each of us for self defence that I realised we were about to embark on a risky military operation

The team arrived in Salisbury after a 16 hour VC10 flight via Cyprus and Nairobi There was hectic activity for two days as Colonel R Blewit late RAMC the Senior Medical Officer arranged for military and medical briefings These covered three main topics — first the political and military situation secondly tropical medicine and finally public health The briefings included a session at the Alexander Fleming Hospital in Salisbury conducted by Professor J Thompson

Manpower resources were split into twelve teams to provide medical help for the assembly places. Most teams consisted of a medical officer and two assistants I was sent to assembly place Delta which was the second largest camp with 3 000 Patriotic Front troops To assist me there were two Royal Air Force corporals One was an SRN and the other a medical secretary There were 30 Australian soldiers running the camp including a Regimental Medical Assistant There were three Royal Engineers to look after the water supply and the numerous other engineering tasks involved in building a small village

My two main jobs at assembly place Delta were to advise on the necessary measures to maintain a high standard of public health and to advise and assist the Patriotic Front medical team on treating their own sick and wounded As soon as the news spread that a doctor had arrived in the area many local villagers came to swell the numbers at the clinic

The camp was on the site of an old mission that had been abandoned during the civil war Initially all the buildings were unusable as they were roofless and it was the rainy season A hospital tent was soon established for use until one of the buildings was roofed with tent canvas Once this was done it made for an improved hospital consisting of two male wards and a female ward for ten patients each Two treatment rooms and a medical store were constructed to complete the hospital

In addition to the hospital there were three tents around the camp where people were seen on an outpatient basis These were staffed by a team of about 50 Patriotic Front medical assistants and orderlies led by a comrade Joseph who had had four years medical training in Tanzania

Initially there was a lot of suspicion on both sides with the Patriotic Front wanting the medical supplies without losing face by my seeing the patients There was clearly bargaining to be done and the first few days work were somewhat tense with the heavily armed Patriotic Front guerillas being rather sullen I generally gave them enough supplies each morning to treat twice the number of cases that I had seen the previous day Over the first week a good rapport was established and they realised that I could help a good deal in the diagnosis and treatment of their illnesses as well as being a supplier of stores

The second task that of public health was more vital than the treatment of individual illnesses We had established a camp of 3 000 people in an area which initially had a limited water supply and few latrines It was known that there was cholera in Mozambique and that many of the Patriotic Front had crossed from that country in the previous few weeks

The water supply was the responsibility of the Royal Engineers Water was pumped from a nearby dam through a sand filter and then into a tank for chlorination and detasting Initially there was only one outlet for the Patriotic Front albeit with a plentiful supply This meant that many were tempted to take untreated water from the dam and small streams After two weeks a larger pump and tanks were installed with 1 500 metres of piping to give over 30 outlets throughout the camp The incidence of mild outbreaks of gastroenteritis then fell considerably

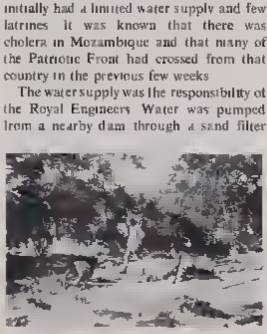


Fig 1 *Laying water pipe*

The main worry for the Europeans was schistosomiasis as nearly all surface water in Rhodesia is infected The filtration and chlorination were both effective treatments for this and together provided a safe system

The deep trench latrines from the original mission were still in reasonable shape and deep enough to act as natural cesspits They had concrete tops making them easy to keep clean Not so those we had to construct for hard bedrock at a depth of only ten feet or so made them too shallow to prevent flies breeding leading to a constant battle

The African is an untidy person who discards any rubbish as soon as he has finished with it It was an uphill task to persuade the Patriotic Front through their own commanders to use effective refuse pits rather than just piles of gash near to their cooking areas The concept of contained living was anathema to their way of life as guerillas and led to frustration on both sides

Medical Problems

All the bullet and shrapnel wounds that I saw were at least two weeks old having been sustained before the cease fire These had invariably been treated by dressing the entry and exit wounds rather than by wound incision Most of them were granulating well with twice daily dressings and applications of gentian violet There was a marked tendency for keloid formation in the scars.

Bilharzia due to schistosoma haemato

bium was very common The common symptoms were of lower abdominal pain and terminal haematuria One day I saw 50 patients all with the same complaint! Unfortunately it was not for a further week that I got a supply of Niridazole (Ambilhar) for treatment It would have been naive to think that I could have made much impact on this widespread endemic disease which requires a more radical approach for its control than the measures described above

Malaria was very common and the Patriotic Front were good at treating it. They regarded any fever as malaria until proved otherwise Chloroquine was always used and surprisingly in the correct dose Most cases were treated as outpatients with only the more serious being admitted to the camp hospital I saw three cases of cerebral malaria who all responded to intravenous chloroquine.

The Commonwealth Monitoring Force used Maloprim (12 5mg pyrimethamine and 100mg dapsone) once a week as chemoprophylaxis and I saw no definite cases of malaria amongst our own troops but I did treat two fevers with chloroquine to be safe

Tick typhus was common among the Commonwealth troops Once recognised it responded well to treatment with tetracycline Unfortunately the first victim for whom I was slow to make the correct diagnosis was myself! The symptoms of fever headache and a painful lymphangitis in addition to the tick bite were very unpleasant

Many of the local children had scabies which often became infected A large supply of gamma benzene hexachloride enabled me to go a long way towards relieving this major cause of suffering

There was plenty of opportunity to practise dentistry and once again all who saw the dental first aid valise were impressed by it whether they were RAMC RAF Australian New Zealand Rhodesian or Patriotic Front Most of the work was extracting teeth with huge cavities mainly the molars I did not attempt to extract any teeth which were not loose and would try without local anaesthetic first. If this did not succeed I then gave a nerve block with lignocaine but supplies were so tight that where possible I did without

Fig 2 *A circuit [illegible]*

Change of Camp

After three weeks at Delta I was transferred to assembly place Lima as there had been an unexpected problem with the medical cover there The change of camp enabled me to see both sides of the Patriotic Front At Delta they were all ZANLA supporters of Robert Mugabe They were well organised medically but not in other aspects At Lima there were 800 ZIPRA soldiers all supporters of Joshua Nkomo Militarily these guerillas were well organised with a battalion command structure less so on the medical side however There were four medical orderlies who were keen and of a moderate standard but they were under the command of two medical officers who had received only about one year's training

With a team of one RAF corporal and a New Zealand sergeant this gave me more work than I had at Delta looking after a larger number of men Most of the work was

Fig 3 *Stapled co[illegible]*

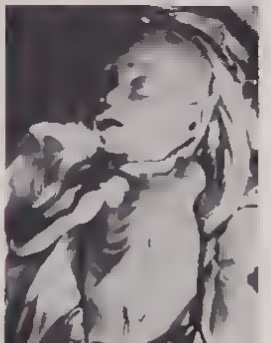


Fig 4 *A dish [illegible]*

with the local villagers I would see about a hundred each day They would mainly attend in the afternoon when the sun was at its hottest I could not record the temperature — it was over 44°C the top of the clinical thermometer for about six hours each day This meant that any metal was unpleasant to touch — whether it was a stethescope or scissors It also made a mockery of the instructions on most injections and tablets "to store in a cool place. The only harmful effect that I saw was that many capsules became sticky in the heat

My obstetric technique was tested along with my dentistry when a woman who was seven months pregnant presented with labour pains and vaginal bleeding Fortunately I was able to take her by land rover to a local hospital 90 miuntes away Within an hour of arriving at the hospital she gave birth to a baby weighing three pounds two ounces I saw mother and child a week later and both were doing well A particularly trying paediatric case I recall was that of a six week old baby girl with pyloric stenosis and associated severe dehydration She made a good recovery after a Ramstedt's operation in the hospital

Many of the older patients were just suffering from the effects of old age — mainly joint pains and backache from working in the fields each day They were clearly disappointed when I could not give them an injection that would cure all! Most patients were eager for injections and the persistent would go away smiling after an injection of sterile water or multivite

Whilst at Lima I had the chance to take a few days' leave and went to see Victoria Falls This was a wonderful sight and much more magnificent than I had expected It was very refreshing to have a break from the bush and to stay in a comfortable hotel after being in a tent for so long There was a swimming pool and female company to make it enjoyable However it was soon

back to the bush and the elections were approaching fast There was a noticeable increase in tension throughout the country during the run up to the election with a strong feeling of disbelief amongst the Europeans that such an outcome had occurred without a major breakdown of the cease fire During the final week there was fervent political and military activity Police and army forces were integrated into the Patriotic Front camps to help stabilise relationships The two sides began to work alongside each other and both became more confident of the future Six hundred Patriotic Front troops went to a Rhodesian army camp to begin the integration of forces I went to help with this task and with some Rhodesian doctors, gave each of them a medical examination Only four were unfit — an amazingly low number compared to the average African intake into the Rhodesian army

The election was an extraordinary climax to the operation Along with most of the team I heard the result north of the equator while flying home. It was fascinating to learn the reaction to Mr Mugabe's victory This was the result that most of us who were in the bush camps predicted We had arrived in a tired and trumbled Rhodesia but left a new country Zimbabwe a country optimistic for a free and fair future Zimbabwe is a country of great potential and I wish them luck in developing this

Cardiac Support Using The Intra-Aortic Balloon Pump

J.W Sharp

Introduction

Coronary Care Units (CCUs) were established in the 1960s to provide continuous electrocardiography monitoring and efficient cardio pulmonary resuscitation for acute coronary patients the emphasis being on the recognition and treatment of ventricular fibrillation Subsequently greater understanding of the mechanisms of dysrhythmias and the development of suppressant drugs became the primary aims of CCUs ie the recognition of lesser 'warning' dysrhythmias and by their attempted treatment the prevention of ventricular fibrillation With further advances in medicine these units today are striving towards reducing myocardial injury

Fifteen per cent of all acute myocardial infarction patients develop cardiogenic shock (Table 1) with a reported mortality in excess of 85 per cent [1,2] Post mortem studies demonstrate infarction of at least 40 per cent of the left ventricular mass often a combination of old and new infarcts Similarly left ventricular angiocardiography performed in the acute situation suggests at least 50 per cent of the ventricular wall is non-functional These data provide a basis for the lack of success of drug therapy in this syndrome ie there is inadequate remaining cardiac muscle to respond to drug therapy [3]

The facilities available will largely influence the management of cardiogenic shock Five elements of management can broadly be identified in the attempts to improve patient survival

TABLE 1 CARDIOGENIC SHOCK

CRITERIA FOR THE DIAGNOSIS OF CARDIOGENIC SHOCK

1 DIAGNOSIS OF ACUTE MYOCARDIAL INFARCTION

2 CLINICAL PRESENTATION

- a SYSTOLIC BLOOD PRESSURE < 90 mm Hg OR 30 mm Hg LOWER THAN THE PRIOR BASAL LEVEL
- b OLIGURIA < 20 ml of URINE PER HOUR
- c COOL PERIPHERIES
- d SWEATING
- e CYANOSIS VARYING DEGREES
- f MENTAL CONFUSION

3 CARDIOGENIC SHOCK IS PRESENT IF THE ABOVE CLINICAL PICTURE PERSISTS AFTER

- a ELIMINATION OF ARRHYTHMIAS
- b OXYGEN ADMINISTRATION
- c ABOLITION OF PAIN
- d TRIAL OF VOLUME EXPANSION
  or
- e 4 TO 6 HOURS AFTER ONSET OF MCI

Support therapy — oxygen sedation correction of hypovolaemia and acidosis
Drug therapy — antidysrhythmic drugs glycosides inotropic agents
Electrical cardiac pacing — for slow heart rates unresponsive to drug therapy and causing haemodynamic embarrassment
Circulatory assistance — intra-aortic balloon pump assistance
Emergency surgery — revascularisation by saphenous vein coronary artery bypass graft infarctectomy mitral valve replacement repair of interventricular septum

Circulatory assistance the fourth element listed above is provided by an intra aortic balloon pump (IABP) Much of the pioneering work on the balloon pump was done during the latter half of the 1960s by Drs Mortimer Buckley and Eldred Mundth at the Massachusetts General Hospital Boston [4] Circulatory assistance is achieved by means of counterpulsation the removal of a volume of blood from the aortic root during systole and returning it during diastole The effect of this is to (1) increase the oxygen supply to the myocardium through increased coronary artery perfusion resulting from elevated aortic diastolic pressure (2) decrease the left ventricular workload with a reduction in the intramyocardial tension brought about by lowering the arterial systolic and left ventricular filling pressures so that myocardial oxygen requirements are reduced (3) increase the cardiac output by 500 ml per minute with reduction in the heart rate by about 10 beats per minute

Indications for Use

1 *Myocardial infarction* When cardiogenic shock left ventricular failure or low output states are complications of myocardial infarction including ventricular septal defect or mitral regurgitation

2 *Unstable angina* Defined as pain at rest unresponsive to drug therapy

3 *Post-operatively* Following open heart surgery when patients cannot be taken off cardio pulmonary bypass successfully

4 *Chronic heart failure* eg cardiomyopathy This is considered by some to be a controversial indication at present

Outline of Method

The AVCO IABP Model 10 (fig 1) uses a standard AVCO three chambered balloon catheter (figs 2 and 3) which is inflated or deflated using recycled helium

The central segment of the balloon is inflated first followed by the proximal and distal segments This prevents blood

Fig 1 *Intra aortic balloon pump console AVCO Dimensions 102 x 61 4 x 74cm Weight 176 5 Kg*

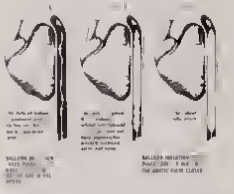


Fig 2 *The intra aortic balloon in post on*

trapping and excessive aortic wall stress Balloon sizes of 20 30 and 40 cc are available for adult use with 4 and 12 cc for paediatric use (fig 3) Though the balloon is fabricated from antithrombogenic material, it is nevertheless advisable to anticoagulate the patient with heparin

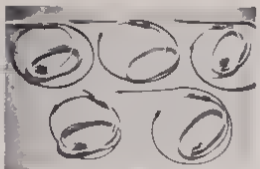


Fig. 3 *AVCO thin walled urethane balloon catheters Balloon sizes 40 30 20 10 and 4*

Balloon insertion can be undertaken in the operating theatre or ward bed the patient being sedated with small doses of diamorphine and/or valium if necessary Radial artery pressure and ECG monitoring is established Usually under local anaesthesia the deflated balloon is inserted via a femoral artery cut down (usually the right) and advanced into the descending thoracic aorta until the tip lies just distal to the left subclavian artery (fig 2) A dacron sidearm graft is anastomosed to the femoral artery so that arterial continuity is maintained and a tourniquet is applied around this graft and catheter

The position of the balloon can be checked by a chest X ray alone and pumping started before wound closure The wound is covered with a small non occlusive dressing A pressure bandage is never used

Connecting the balloon catheter to the IABP console is approximately 1 8 metres of plastic tubing its length considerably assisting movement of the patient by the nursing staff

Automatic detection of the R wave from the patient s ECG by the IABP console triggers inflation and deflation of the balloon (fig 4) and proper pumping can take place with most cardiac rhythms including bigeminy If the patient s ECG is unavailable the pump can be triggered by the arterial pressure waveform or by a built-in ECG simulator

Micro computers are used to monitor and display the patient's heart rate systolic mean and diastolic blood pressure cardiac output and balloon gas volume Problems requiring immediate corrective action will be identified on the oscilloscope which will also display the steps that should be taken for immediate correction If pump malfunction is a possible danger to the patient it will automatically cease operation until the condition is corrected

Available with the Unit is a portable power supply using rechargeable batteries which give an operating power source for more than one hour thus permitting active pumping during a power cut or during patient transportation

Brief Patient Plan

Many patients improve after a few hours on the intra aortic balloon pump with the maximum effect for most patients being attained within 48 hours One group of patients can then be successfully weaned off the balloon which can be removed

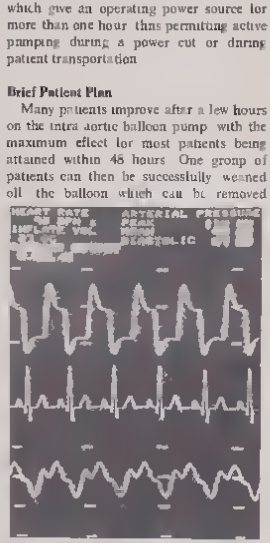


Fig. 4 *D[illegible] pump tim[illegible]*
A B[illegible]
B I[illegible]
C R[illegible]

without haemodynamic deterioration A second group are 'dependent ou balloou support, which is either withdrawn or maiotained during investigations to find surgical correctable lesions such as mitral regurgitation ventricular septal defect left ventricular aneurysms or potential revascularisation sites around the infarct Balloon support is then continued until operation is technically feasible usually 4 to 6 weeks and may be continuad into the immediate post-operative period

Additional means of support can be used during balloon pumping eg intermittent positive pressure ventilation electrical cardiac pacing anti-arrhythmic or drug support therapy

Contra-indications and Complicatioos

Complications associated with this procedure are infectioo haemorrhage at the balloon site or arterial line occlusion of the femoral artery dissecting aortic aneurysm thrombi or emboli and use of the IABP is contra indicated in the presence of aortic valve insufficiency and aortic dissection

An overall incidence of complications of 17 4 per cant has been reported in 86 patients who were treated by intra aortic balloon pump support for both medical and surgical indications [5] Arterial insufficiency was the most common complication necessitating removal of the balloon Ischaemia of the legs resulted in permaneot damage in four patients, one patient requiring bilateral above knee amputation

In an effort to prevent lower limb complications the leg distal to the point of insertion of the balloon catheter should be observed at half hourly intervals for signs of ischaemia and the wound inspected for haemorrhage or haematoma formation The surgeon may order a reduction in the froquency of these observations after 24 hours To preveot kinking of the balloon catheter the patient should not be allowed to sit up above a 45° angle nor should the groin be flexed

Patient Sorvival

Reported results for patieots with cardiogenic shock treated by using the intra-aortic balloon pump without additional surgery show a wide variation in those who survived to leave hospital from 12 per cent[6] to the unusually high survival rate of 71 per cent[5] see also Table 2 [5 11]

TABLE 2 REPORTED HOSPITAL DISCHARGE SURVIVAL RATES IN PATIENTS WITH CARDIOGENIC SHOCK FOLLOWING TREATMENT WITH INTRA AORTIC BALLOON PUMP ASSIST

	TOTAL NO OF PATIENTS	PERCENTAGE SURVIVORS
DUNKMAN et al 1972 [7]	25	16
SCHEIDT et al 1973 [6]	87	17
LAWRENCE et al 1974 [3]	13	46
O'ROURKE et al 1975 [10]	30	36
WILLERSON et al 1975 [6]	26	12
LEFEMINE et al 1977 [5]	14	71

NB LEFEMINE (1977) [5] also cites in his Article a report by HOCHBERG (1976) [11] involving 112 patients with a 28% survival rate

One hundred patients in cardiogenic shock treated with the IABP were studied in ten centres [6] Eighty-seven patients were retained in the study, of whom 15 survived to leave hospital (17%) The authors suggest that the application of balloon pump support was delayed because of the trial criteria which prevented any further improvement in survival in the presence of massive and irreversible myocardial damage despite adequate circulatory support provided by the balloon pump

Experiencing similar difficulties O Rourke and his colleagues[12] adopted a different procedure for instituting IABP support requiring

1 A diagnosis of definite acute myocardial infarction by World Health Organisation criteria [13]

2 Definite evidence of acute severe heart failure by clinical and radiological criteria[12] or if such signs are equivocal an increase

in pulmonary artery pressure above 16 mm Hg wedge or 20 mm Hg mean and

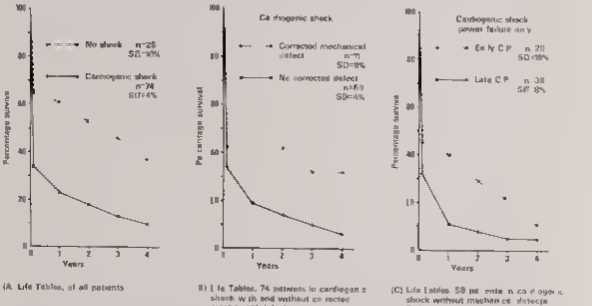
3 Absent or completely unsatisfactory response to medical treatment over at least a 2 hour period such treatment to include oxygen by mask relief of pain adequate diuretics (the maximum dose of frusemide was 80 mg by intravenous injection) and correction of haemodynamically significant dysrhythmias

O'Rourke[12] studied 100 patients with severe refractory cardiac failure complicating myocardial infarction treated by arterial counterpulsation. 74 of these patients were in shock of whom 25 (35%) survived to leave hospital. Where IABP support was started within eight hours of the apparent onset of cardiogenic shock the long term survival was almost twice as high as compared with patients in whom counterpulsation was commenced more than eight hours after the onset of shock (see reproduced Life Tables in fig 5)

Comment

For the intra aortic balloon pump to have maximum success it must be considered early in the management of seriously ill patients. It is becoming apparent that a significant number of these patients improve on the IABP and can be subsequently transferred to a cardiothoracic unit for further investigation and treatment.

Adopting this rationale the London Chest Hospital established a mobile cardiac support unit using an intra aortic balloon pump. This service was started in July 1977 with a vehicle bought by donations from the people of the East End of London. The team usually consists of a cardiologist and surgical registrar, an anaesthetist nursing sister and perfusion technician assist when available or necessary. However the service can be provided by a surgeon alone with one other eg. a nursing sister



(A. Life Tables, of all patients

B) Life Tables, 74 patients in cardiogenic shock with and without corrected mechanical defects

(C) Life Tables 58 patients in cardiogenic shock without mechanical defects Early counterpulsation (CP) which started within 8 hours of the apparent onset of shock late counterpulsation which started 8 hours after apparent onset of shock

Fig 5 *Patient survival following arterial counter-pulsation in 100 patients with severe refractory heart failure complicating acute myocardial infarction* [12]

The armed services do not possess an IABP which is not surprising as they are expensive pieces of equipment the AVCO models costing between £16 000 and £20 000 at July 1978 prices Balloon pump support is undoubtedly beneficial to patients in cardiogenic shock and would be of particular benefit to the younger age group

Acknowledgements

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Data Analysis I. Some Statistical Tests for Small Related Samples*

R. J. Pethybridge

Introduction

Many doctors involved in part-time research are often confronted with the analysis of data arising from small samples. During their training as students statistical methods were largely directed towards analysis of data from large samples with a normal or Gaussian distribution. In this brief article it is intended to illustrate two statistical tests for use with small samples.

Example

In a pilot clinical trial 15 volunteer patients (initially randomly selected from a large population) suffering from a common complaint are asked to assess which of two treatments A or B they prefer. The trial is conducted over a reasonable time span and is of a crossover design (i.e. half the patients try treatment A before B and the remaining patients try treatment B before A). It is known that the treatments are effective only during the periods of use and the patients revert to their original conditions on stopping either treatment. In addition to information obtained on the patients' subjective impressions of the relative effectiveness of treatments A and B clinical measurements/specimens are taken at appropriate (pre fixed) trial times. The specimens are accurately analysed to ascertain the levels of factor Y which are related to the complaint. At the end of the pilot trial ten patients prefer A to B, four patients prefer B to A, and one patient cannot decide, so can the experimenter conclude that A is superior to B or is it necessary to conduct a larger trial before making a final decision?

Analysis 1. Application of the Sign Test

As a first stage consider the analysis of the subjects' impressions of the relative effectiveness of the two treatments. Ten patients prefer A (denote by +), four patients opt for B (denote by −) and one patient cannot decide. Before conducting the trial the experimenter was interested in testing the "null" hypothesis — that is to say there is no difference between A and B — against one of three possible alternative hypotheses — (1) A is preferable to B, (2) B is preferable to A, or (3) one treatment (unspecified as A or B) is preferable to the other. Hypothesis (3) covers the cases "A is preferable to B and B is preferable to A". The choice of alternative hypotheses can affect the decision whether or not to reject the "null" hypothesis.

In our example what is the probability of obtaining either the pattern of 10 out of 14 patients preferring A or the more extreme patterns (e.g. 11, 12, 13, 14 patients prefer A) if the null hypothesis is true? The sign test is a simple statistical test to apply in this example. The test is useful for investigations in which quantitative measurements are not possible or are difficult to obtain, but it is possible to assess the relative values of a pair of observations from each individual (i.e. A is better than B, B better than A, or no decision). The

**The first of a series of articles in which various statistical techniques will be discussed.*

sign test can be used in situations where (1) the individuals are randomly drawn from a single population or a mixture of populations (e g sex, age race) and (2) the differences of two observations from each individual do not have to follow a normal distribution However it is assumed that, in the example given, observations which may be affected by specific features of any one individual (e g sex age) are eliminated by the crossover design and differences in 'paired' observations reflect differences in treatment effects As the name of the test suggests the data set is composed or reduced to a set of plus and minus signs

The sign test is just the binomial test with the probability of either a plus or minus sign or outcome being 0 5 We can assess from tables of the binomial distribution the probability of any combination of '+'s and '-'s Omitting the data for the one patient who cannot decide between treatments A and B we find that the probability of obtaining exactly ten patients preferring A out of a total of 14 patients is 0 06 More important, the probability of ten or more patients (out of 14) preferring A is 0 09 The experimenter has to adopt some criteria in deciding whether to reject the null hypothesis in favour of the alternative hypothesis If he decides to accept the alternative hypothesis — A is better than B — if ten or more patients prefer A then he is likely to reject the null hypothesis in 9 per cent of identically conducted experiments when in fact, the null hypothesis is true The experimenter in this example has decided beforehand to accept a 5 per cent risk of rejecting the null hypothesis when it is actually true In these circumstances the results of our example do not lead to rejection of the null hypothesis The reader might like to check that if 11 patients out of 14 prefer A then the null hypothesis would be rejected in favour of the alternative hypothesis — A is preferable to B The experimenter might consider his trial has given a borderline result and might extend the trial by treating more patients and apply sequential methods of analysis [1]

consider his trial has given a borderline result and might extend the trial by treating more patients and apply sequential methods of analysis [1]

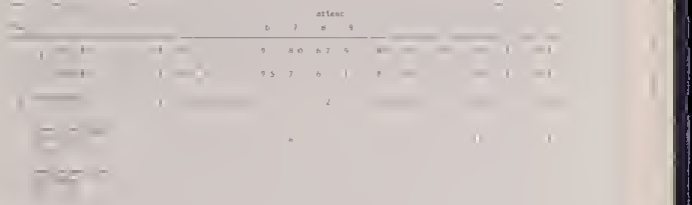
Analysis 2 Application of the Wilcoxon Signed Rank Test

Now consider an analysis of the clinical measurements/specimens obtained from our 15 patients whilst under treatments A and B. We assume each patient yields one measurement per treatment In the sign test the data are reduced to two categories '+' and '-' with large numerical + values being given equal status with the small '+' values The Wilcoxon signed rank test does require the numerical quantities associated with the signs but the distribution of all the sample values must additionally satisfy two (mathematical) assumptions — symmetry and continuity In simple terms a symmetric distribution is one in which the left half of the frequency distribution (up to the median) is the mirror image of the right half The assumption of a symmetric distribution is not as strong as an assumption of a 'normal' or Gaussian (alternative name) distribution because whilst all 'normal' distributions are symmetric not all symmetric distributions are normal (e g uniform distribution, binomial distribution with parameter p = 0 5) The symmetric distribution implies that the median and mean are identical and hypotheses on medians equate to hypotheses on means The continuity assumption requires no two observations to be equal In practice tied observations do occur and a slight adjustment in the calculation of the test statistic is available

Table 1 presents the data on factor Y obtained from the 15 patients under both treatments A and B.

The evaluation of the Wilcoxon test statistic consists of the following operations

ATIONS OF WILCOXON TEST STATISTIC



(1) compute the difference (Di) of each pair of observations (YA YB) from the same patient i (row 3 table 1) (2) delete zero differences (3) ignore the signs (in row 3) of the differences and rank the observations in increasing order (1, 2 14) — equal observations (ties) are allocated the average of the ranks which would be assigned if the observations are not equal (row 4) (4) copy down the ranks from row 4 if the observations in row 3 are positive otherwise insert zero (row 5) The test statistic T is equal to the sum of the ranks in row 5 (i e 81) The maximum possible rank sum (i e 105) occurs when all 14 (patient 6 ignored) paired observations are positive If the null hypothesis (mean levels of factor Y are equal under treatments A and B) is true we would expect a tendency towards equal numbers of + and − values in the differences (row 3) with the test statistic having a rank sum towards the centre of the range of possible rank sums (i e 0 to 105 in this example) Large or low rank sums within the range would not tend to favour the null hypothesis Critical values (i e corresponding to rejection of the null hypothesis) of the Wilcoxon test statistic T for a range of probability levels are given in books on non-parametric statistics otherwise refer to Wilcoxon's publication Some rapid approximate statistical procedures [2] The tables usually provide the critical values for low rank sum totals The high critical values are obtained by subtracting the tabulated low critical values from 0 5 n (n + 1) where n equals the number of non zero difference (YA YB) values (in row 3) For this example the 5 per cent (10%) rejection regions (if the alternative hypothesis states that one treatment (unspecified) is better than the other) correspond to rank sums less than 22(26) or greater than 83(79) The null hypothesis (treatments A and B are equally effective) can be rejected at the 10 per cent level (T exceeds 79) but not at the 5 per cent level (T less than 83) If prior to data collection the alternative hypothesis had been stated as A is better than B' then the test would lead to rejection of the null hypothesis at the 5 per cent significance level (i e 5% rejection region corresponds only to rank sums greater than 79)

The example illustrates the appropriate practical action to take if there are ties in the absolute values of the differences of paired observations Too many ties in the sample of differences will affect the experimenter's final conclusions as the probabilities associated with a given critical value may be overstated i e a result appearing as significant at the 5 per cent level could be only just significant at the 10 per cent level To reduce the number of ties- data should not be rounded off until after

completion of the calculation

The experimenter should remember that just as statistical tests are based on some certain implicit assumptions so are the statistical tables of critical values given in textbooks Deviations from the basic test assumptions may lead to large errors in reporting final significance levels When using small samples for which the test assumptions may be only approximations the experimenter should avoid quoting apparently significant results at an extreme level (say 1 in 10 000) since if a more appropriate statistical test was used the test statistic might not be significant at 1 in 100

An impression of the symmetry of the distribution of sample values (differences) can be obtained by plotting on ordinary (linear) graph paper the sample cumulative distribution function The sample cumulative distribution function is the plot of the proportion of sample values less than or equal to value x versus value x where x is each of the sample values For a symmetrical distribution a symmetrical pattern about the sample median value should result The pattern may appear lop sided (i e values to the right of the median may be further from the median than those to the left of the median) particularly for a small number of sample points but symmetry may be improved by applying a simple transformation (e g logarithm square root) to the basic data before taking differences

Analysis 3 Application of the paired t test

The paired t test is applicable if in addition to the assumptions of the Wilcoxon test the differences of pairs of observations (for each subject) are normally distributed The experimenter can gain an impression of normality by plotting the sample cumulative distribution function on probability graph paper On this graph paper the sample cumulative distribution function for normally distributed observations will lie along a straight line with large deviations possibly occurring with small samples Transformations of the basic data might improve 'normality' and permit the application of the t test The data of differences (all 15 values) in table I are not normally distributed although blind application of the t test would lead us to similar conclusions as with the Wilcoxon test The t test is reasonably robust for testing hypotheses concerning means of samples for which the data are not quite "normally" distributed

Efficiencies of the sign Wilcoxon and t tests

One statistical test C might be expected to be more efficient (i e in practical terms the test requires less data to reject the null hypothesis at a desired significance level) than another test D if the assumptions of test C are more accurately fulfilled Power efficiency relative efficiency and asymptotic relative efficiency (abbreviated as ARE for infinite sample size) are terms used by statisticians to compare the power properties of statistical tests An ARE of 1 0 implies the two tests have equal power If the ARE of test C compared with D is under 1 0 then test D is more powerful When the conditions of the t test are fully satisfied the ARE of the Wilcoxon test relative to the t test is 0 95 (or 95%) In small normal samples the relative efficiency of the Wilcoxon test to the t test remains close to one whilst the sign test compared to the t test is 95 per cent 75 per cent or 64 per cent efficient for samples of size 6 13 or infinite respectively

When the differences of pairs of observations arise from a uniform distribution the Wilcoxon and paired t test have equal efficiency for large samples whilst the sign test has only one third the ARE of the other tests However the sign test has higher AREs 1 33 and 2 compared to the Wilcoxon and paired t test

respectively when the differences arise from a double exponential distribution

These illustrations show that the distribution of the sample values (differences of paired observations in our example) can have a marked effect on the relative power efficiencies of statistical tests It is important to decide if the data fulfil the assumptions of the statistical test used for testing the desired hypothesis In the one-sample or matched paired sample cases where at least the assumptions of the Wilcoxon test are met the Wilcoxon test is only slightly (in practical terms) less powerful than the t test and may be much better in some situations For these reasons the Wilcoxon test is recommended for testing hypotheses concerning the means of small or moderate size samples (e g under 30 observations)

The sign test is a useful quick method for testing hypotheses on medians (means if symmetry assumption holds) of small samples In moderate size samples the Wilcoxon test (if applicable) is preferred Modifications of the sign test lead to two useful tests — (1) the McNemar test for significance of change in a 2×2 contingency table and (2) Cox and Stuart test for trend in a sequence of numbers — the reader is referred to statistical textbooks for the details

Finally a cautionary comment — today's cheap programmable calculators may enable the experimenter (quickly) to evaluate basic statistics relating to experimental data but turning a blind eye to the assumptions of the statistical test being used can and will lead to fallacious conclusions

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As it was in the beginning . . .

D P Gurd

In some ways the year 1934 does not seem very far away At that time the Medical Services of the Forces were not very popular and a short time prior to this the British Medical Association and the medical schools had not been keen to advise young doctors to join After certain improvements this ban was taken off and advertisements appeared in universities giving salaries for medical officers in the Navy and the opportunities which such service would bring The proposal was that one could serve a Short Service Commission of three years and obtain a gratuity of £500 or proceed for a further two years and get the sum of £1 000 These amounts in those days looked very attractive and as the salary of a Surgeon Lieutenant on joining was five times that which one was receiving as a house surgeon the idea had certain attractions Added to this were the possibilities of travelling far and wide throughout the Empire which in those days encompassed most of the earth

I was advised by one of my teachers that a short period in the Navy would be very good for me as I seemed extraordinarily lethargic in the afternoons and in his knowledge no naval officer ever did anything of importance between midday and 6 pm Having done three house appointments I applied for a Short Service Commission in the Royal Naval Medical Service and after a short interval I received a letter asking me to attend at Archway Block in the Admiralty for interview and medical examination

I [illegible] arriving on a sunny day at the Admiralty There were one or two mounted police in the vicinity but I am quite sure that they were not placed there to control any mad rush of young medical graduates to obtain commissions I entered a lift in the building with an elderly Admiralty messenger who took me along to a room in the Medical Department and proceeded to do the preliminaries to examine my vision He was shortly joined by a naval medical officer in plain clothes I found in the Department that all the officers wore grey flannel suits with waistcoats the grey flannel suits being of approximately the same type and shade I was received in a most courteous manner and after a short chat I found myself being passed from one office to another All those whom I met were extraordinarily patient courteous and polite I knew that I was going to be interviewed by the Medical Director General of the Navy and having ascertained that he was a Vice Admiral, I assumed that he would be wearing a uniform depicting great prosperity and importance Eventually I was ushered into a room where there were two middle aged men I did not know who they were and I answered their questions with complete lack of embarrassment and it was only when one of them referred to something that the other had said and gave his name as Admiral Buckeridge that I realised when Admiral Buckeridge referred to the other officer as Sir that this other officer must be a person of considerable

eminence [illegible] needs be the Medical Director General himself. I was then examined by a particular medical officer who [illegible] took off my jacket but insisted that I should not remove my shirt. He listened briefly to my chest with his stethoscope and then concentrated almost entirely on the shape and function of my feet. These are and always have been most excellent portions of my anatomy and I am still puzzled to know why his fascination was so fixed.

I went home and after a couple of weeks received a letter from the Medical Director General's department informing me that I had been selected for a temporary commission as Surgeon Lieutenant and advising me to proceed to the Royal Naval Hospital at Haslar on September 20 1934. I do not recollect much about the journey from Waterloo to Portsmouth Harbour but I do recall on arrival at the station giving my two heavy suitcases to a porter who not only took them down the ramp to the ferry but also crossed with me to the Gosport side and placed my luggage in a taxi. The taxi took me to Haslar by the road route for in those days there was a bridge which was approximately where Pneumonia Bridge is now. It was a flat bridge over which one could drive in a vehicle. Before one could cross the bridge one had to pay a toll at a little white cottage and the old gentleman with whose features I became familiar as the weeks passed would emerge with an appearance of extreme irritation which became much worse in later weeks when he realised we were Haslar residents and therefore did not have to pay the sixpence which was exacted from the public.

On arrival at the Mess at Haslar my luggage was removed from the taxi by two elderly Wardroom attendants. These men were former Royal Marines and were extraordinarily erect and military in their bearing although they seemed to be rather senile to me at that time. I met in the ante room the other nine members of the batch and we were told that we must change into mess undress in order to have dinner in the Wardroom. Unfortunately the naval tailors who were supposed to be sending my uniform to Haslar had only been able to despatch part of it and of course the essential undress was not included. This appeared to be rather a serious misdemeanour and when I offered to appear in a dinner jacket this caused great concern and an emergency meeting of the Mess Committee was called. At the conclusion of this I was informed that I might on this occasion as a special dispensation eat my dinner in a dark lounge suit and this I proceeded to do. After dinner we played snooker until it was time to go to bed. I can still recall the aroma of new clothes and new shoes as well as the strange perfume of tar and Jeyes fluid which seemed inseparable from the Haslar of those days.

Next morning we appeared for breakfast in monkey jackets and were informed that it happened to be the day upon which the Commander in Chief Portsmouth was going to inspect the hospital. We changed our uniforms on two occasions. We were in monkey jackets for breakfast. We then had to change into frock coats with swords to be greeted by the Surgeon Rear Admiral. The Commander in Chief wanted to see us in working rig. As this Commander in Chief had a great reputation as being a remarkable stickler for correctness of dress I could not fail to notice certain small smiles as he looked at us because owing to the difficulties with the naval tailors several of us were wearing shoes and ties which did not conform to the official pattern. Eventually we got to the wards and I was interested in the immense amount of paper work which seemed to be necessary. The Sisters sat in their cabins and when not engaged on this paper work their only nursing duties appeared to be going round with the medical officer and from time to time

administering injections or dangerous drugs There was a Sick Berth Petty Officer attached to each ward and he was the buffer between the Sister and the male staff and exercised discipline to a most admirable degree

We then had to proceed to the library before lunch for a talk by the Medical Officer in Charge We changed into frock coats and sat round a table awaiting the arrival of the Surgeon Rear Admiral He was a small man with a cheerful face and a slight torticollis He spoke well and I shall not forget his address The main purport of it seemed to be that we had taken rather an extraordinary decision and that while wearing the uniform of naval officers we were different from other naval officers After a long period of struggle the uniforms had become alike except that we were distinctive cloth between our stripes Not many years before the cord on the upper stripe had been permitted to non executive officers for the first time and the type of brass hat given to the executive and the non executive officer were now similar He explained to us the difficulties of life as a naval medical officer and stressed the importance of how our conduct should be modified as a consequence of this I still remember his closing sentence which I think is likely to be a quotation although I have not been able to find the source. He used the words It is not for you the trumpet's blast upon the harbour bar or a pennant fluttering in an evening breeze. He then turned on his heel and walked out

During the last few weeks at Haslar one of the highlights was a visit from the Medical Director General himself We had seen photographs of visits of previous MDGs and noted with some apprehension that he was accustomed to wear morning dress tall hat and white spats on such occasions We managed to send a message to the current Medical Director General that we would wish him to appear in uniform and in a day or two we heard that he had complied with our request He duly came to the hospital and met us in the library giving us a short address of welcome We then repaired to the Mess before lunch and each managed to have a few words with the Director We then proceeded outside the Mess for a photograph The completion of this photograph was somewhat delayed by the fact that someone had hidden the Medical Director General's cap without which it was impossible for him to leave the building with any degree of decorum He pleaded with us to restore it to him as it was the only one he had and it miraculously appeared I still have a copy of the photograph somewhere in my possession One of the remarkable features of it is the placing side by side of the Medical Director General and the Surgeon Rear Admiral in the front row in accordance with usual custom But the Director was a tall man slim and very good looking The Surgeon Rear Admiral was fraught with the slight torticollis which I have mentioned This photograph hung in the hall of my mother's house for many years and irreverent guests who studied it almost invariably asked Who is the ventriloquist?

It was usual before we went on duty to be inspected by our wardroom attendants in a little space at the back of the Mess at Haslar near the telephone room The wardroom attendants would correct any defects in our appearance with a juxtapositioning of our swords and sword belts straighten our ties and make suitable comments Despite all this my personal appearance in the photograph which I have just described was I believe used for many years as an example to newly joined medical officers as to how uniform should not be worn

I have mentioned the difficulty in travelling from Haslar to Portsmouth and Southsea where most of us spent our evenings ashore The Portsmouth pontoon

[illegible] stopped at an extra [illegible] as far as I recall it was about 11 pm. This was useless for us of course and on the occasions when one of the cars was not available a liaison had been established with the harbour police who were kind enough to ferry us across the harbour. Unfortunately one of the highly spirited officers seemed to have done something to offend the police causing them to withdraw this vital privilege and several officers found themselves in Portsmouth and unable to proceed back to Haslar. The hour was early in the morning and most of the hostelries were shut. One of the batch recollected that the Salvation Army at all hours of the day and night were never known to turn anyone away. They decided to go to a Salvation Army hostel for the night and were accommodated in cubicles and they paid two shillings instead of the one shilling which apparently was demanded for beds in an ordinary dormitory. One of them told me that they gave as their names those of the most senior officers at Haslar including the Surgeon Rear Admiral and although they felt rather tired and miserable on being awakened in the hostel a few hours later they were somewhat regaled by the knock on the door followed by the announcement of some very illustrious names. I rather regretted missing this little episode but on describing it to my father mentally a very liberal and good natured man he told me that he found it most unbecoming and deplorable and was much relieved that his son had had no part in it.

Weekend leave was very important and most of us spent this in London. The last train on Sunday night left Waterloo at a very early hour and it was usual to catch a milk train which had two or three passenger compartments and which arrived at Portsmouth Harbour very early on Monday morning. There was an apocryphal story that two of the officers were feeling tired and cold at Waterloo and decided to walk along the railway line to Vauxhall. It is fortunate that the trains were not electrified in those days for one of the officers is supposed to have said as he walked "The steps are an extraordinarily long distance apart" in which his colleague replied "I'm not so worried about that but I do find the balustrade very low."

On one memorable Monday six officers actually missed the milk train and came to Haslar by taxi arriving at about a quarter to nine. I can still see three taxis coming round to the space in front of what used to be the officers' medical block and the occupants racing into the Mess having remunerated the taxi drivers. As far as I remember the taxis cost £1 2 10 0d for the journey. I don't think it would be possible to get a taxi to complete such a distance today for any remuneration within reason.

I may have been a little severe in my references to the naval tailors but it must be recorded that we really gave them little chance to fit us out as they could have done. We allowed practically no time for second fittings and everything was very rushed. As a result of all this the Vice President of the Mess said that he couldn't stand looking at us anymore and accordingly commanded that we should remain on board during an afternoon when the naval tailors would come to the Medical Mess and take some of our uniforms away for alteration. We did not take very kindly to this and before going up to the cabin where the tailors were to attend we exchanged uniforms. I can still picture the expressions on the faces of those two gentle polite men and their expressions of complete confidence that they could make everything all right. After a few moments we decided that the thing had gone far enough and we resumed our own uniforms while they got busy with their pieces of French chalk. I don't think that any of my uniforms ever really fitted me as they might have done and one or two of the

smaller ones were bought from colleagues and altered in an attempt to achieve a reasonable fit and appearance

One of the most memorable periods at Haslar was the fortnight during which we were engaged in a course of physical recreation This started off very gently on the first day but the increase in activity on the second day was quite startling so that at the conclusion of the course there was only one member of the batch who was able to stand up and take exercise of any kind We also did courses in diving at *HMS Dolphin* and had the opportunity to go to sea in a submarine We visited the victualling yards which were most interesting especially when one saw the amount of grit being scraped off buttons and weighed also naval serge being subjected to tensions for warp and woof and even the bristles of toothbrushes being examined by very stringent tests to ensure that the Admiralty contractors had kept up to their specifications Each Friday morning the Naval Medical Officer of Health took us to visit a ship or establishment and this was one of the most interesting parts of the whole course in that we were shown everything in great detail there was always a very pleasant pre luncheon session before returning to Haslar

The four months of training eventually came to an end with farewell calls on the homes of the various officers in The Terrace This piece of protocol had to be discharged punctiliously on arrival when one dutifully went to each house at about 4 30 in the afternoon to call and possibly to have tea. If the small indicator in the porch was turned so that the word Out appeared one dropped cards with much relief and proceeded elsewhere Occasionally one was ushered in and invited to partake of tea The residence of one Surgeon Captain was quite different from all the others for the kindness and informality with which one was always greeted- and I was fortunate enough to form a friendship with that family which persists until today The relationship between senior and junior officers was vastly different than Although everyone was very courteous polite and correct I am sure that senior officers were much less approachable than they are now To speak to a Surgeon Captain without his first speaking to the junior would have been quite unthinkable and anything other than a very light social matter demanded that an appointment be made to speak with him in his office during working hours The Surgeon Rear Admiral lived in a world of his own and was treated with extraordinary respect and deference by all the senior Surgeon Captains

We had a very good nurse He was a Surgeon Lieutenant Commander of a few years seniority who was elegant in his personal attire had immaculate manners an extraordinary knowledge of naval protocol and embodied all these qualities with a personality of extreme tolerance and kindness I shall always feel grateful to him for all that he did for me at this critical time

In one respect this course at Haslar was not very enjoyable for me because my wellbeing was imprired by a perpetual sore throat which never seemed to leave me except when I left the area No one seemed interested in giving me any treatment and the ear nose and throat surgeon told me that he was certainly not going to remove my tonsils I was able to overcome this difficulty by encountering an ear nose and throat surgeon whose house surgeon I had once been. He was an expert in the operation of tonsillectomy which he was kind enough to perform on my behalf and I never had a sore throat from that day to this

On my return from Christmas leave I was appointed to the Royal Naval Barracks Portsmouth to await appointment to a seagoing ship. During the few weeks at Barracks I was very interested to meet officers of other branches of the Service as at Haslar one was largely confined to those

from the dental and medical professions The work at the Barracks consisted of doing clinics of a general nature and visiting patients who were sick ashore There was a group of rather senior Surgeon Commanders also awaiting appointments and their attitude towards the Naval Medical Service I did not find inspiring They told me that it was a great mistake for me to join and if I persisted in remaining in the Service there was quite a probability that I would become somewhat like they were This implied a very considerable threat but when one is young one does not take these things too seriously One amusing occurrence was the arrival in my clinic of a rather pale Surgeon Commander He was extremely friendly and asked me if instead of sitting in a chair he might lie down on my consulting room couch to which request I readily agreed Although the weather was not particularly cold he was wearing a greatcoat and a white scarf which one was permitted to do in those days He told me that life in the Navy was extremely hard on the health especially if one went abroad He recounted the various illnesses and disabilities with which he was constantly plagued and told me to be extremely careful if I went abroad especially to the Far East I found out that he was the son of a devoted mother who had a palatial house somewhere on the Riviera She did not approve of him being in the Navy and he was able to spend a great deal of his time on what was then called "half pay" This enabled him to spend long periods with her on the Riviera and not to worry about naval appointments It was said in the Barracks that on one occasion this medical officer was examining a patient's throat and called out "What a terrible throat Bring a gargle at once" The Sick Berth Steward brought the gargle but the gargle was not used by the patient!

My appointment soon came through in a cruiser on the China Station It was customary in those days to spend part of a commission in a large ship and the rest of it in a river gunboat These river gunboat appointments were very much desired and they certainly gave one a wonderful insight into the culture and living conditions of the Chinese conditions which had changed but little in hundreds of years One saw most interesting customs and costumes sedan chairs and walled cities The elegance and dignity of the Chinese people their wonderful devotion to work and their skill in fashioning artistic things is something which had to be seen to be believed They are a people for whom my admiration and affection have never dimmed

I was instructed to proceed to Liverpool to join a merchant ship which was proceeding to Hong Kong I did not realise that I was supposed to join a party in Portsmouth to proceed to Liverpool and being on leave and having some friends in Liverpool I went straight there spending a few days in the city and going along to the docks to join the ship the night before she sailed When I got on board I found that I was being very eagerly searched for and deemed myself fortunate that the officer in charge of the group had a good sense of humour as his thankfulness at finding me overcame any wrath which he might quite justly have felt

It was exciting to be going to the Far East I had been brought up as had most of my generation in the great pride which every British subject had for this large Empire It had been inculcated in me since I was a small boy that being born a British subject was equivalent to drawing first prize in the lottery of life The poems and stories of Rudyard Kipling were a constant source of diet at school and we were taught that the greater part of the world map was coloured red This huge area was the product of the industry and ingenuity of our ancestors and it was our business and responsibility to maintain it as it now was It was an East largely controlled by Britain The Union Jack was flying from Aden to Hong Kong

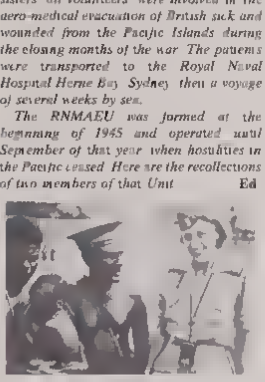
The huge subcontinent of India Ceylon Singapore Malaysia and Hong Kong were all our playgrounds and under the Anglo Chinese Treaties we had access and rights for the ports of the China coast and the right to police the great rivers of that ancient land It was an East controlled by middle aged middle class white men where any insurrection or threat of disorder was hastily dispelled by the appearance on the horizon at dawn of the long grey shapes of His Majesty's ships of war

The Royal Naval Medical Air Evacuation Unit

M Mathews and M Harris

Some of our readers may not be aware that a select company of QARNNS nursing sisters all volunteers were involved in the aero-medical evacuation of British sick and wounded from the Pacific Islands during the closing months of the war The patients were transported to the Royal Naval Hospital Herne Bay Sydney then a voyage of several weeks by sea.

The RNMAEU was formed at the beginning of 1945 and operated until September of that year when hostilities in the Pacific ceased Here are the recollections of two members of that Unit Ed



t the rival [illegible] pack [illegible]

Marjorie Mathews (nee Aston) writes

Early in 1945 a notice appeared on the board in the Sisters Mess at RNH Sydney asking for volunteers for duty with a newly formed RN Medical Air Evacuation Unit Many names appeared on the list and enthusiasm ran high but since only six sisters were required to form the first group most were disappointed

After a stringent medical we were kitted up At first uniform was not available from the Royal Navy and we were temporarily supplied with Australian Army Sisters jungle wear consisting of safari jacket trousers jungle boots gaiters and a Digger s hat We added naval officer s buttons and our own QARNNS hat badges and epaulettes However we soon acquired our own smart uniform tailored trousers and shirt in khaki on which we wore our own buttons and badges and a navy blue cap

On April 7 1945 together with six sick berth attendants we set off from RNH Sydney for Mascot Airport where we embarked in a C47 of RAF Transport Command en route to New Guinea for training Our aircraft was carrying a full load of mail for the Australian services in New Guinea We had to sit on the bags which covered the seats and to judge from all the sharp corners they were full of tins containing goodies After a brief stopover for refuelling at Brisbane we went on to Townsville for an overnight stop as guests of the WRANS Officers Mess where we were received with a great deal of warmth I regret to report that at Townsville there was a hole in my mosquito net and I was visited in the night by the mosquito *stegomyia fasciata* which caused me to fall victim to dengue fever some 48 hours after arrival in New Guinea. The following morning at 0600 we flew on to Lae in New Guinea where much to our amusement we were asked how

the 'pommies' were doing down in Sydney Our Australian disguise had fooled the staff of the primitive canteen at the airstrip and they were shattered when we replied 'We are doing well thank you' with marked English accents!

We were then driven by truck to Nadzab to join the Royal Australian Air Force Air Evacuation Unit for two weeks training. We were under canvas surrounded by thick jungle and head-high Kunai grass The following day we attended lectures by medical officers and sisters of the RAAF but that night I became ill and was admitted to the Australian Army Field Hospital at Lae Nut for nothing is deugue known as 'break-bone fever' As I improved I was kept supplied with study material but my colleagues were fortunate enough to go on flights with the RAAF sisters. After two weeks we moved to Manus in the Admiralty Islands and this was to be our base for almost six months until we were relieved by another team of sisters We were met by our Medical Officer and Flight Coordinator Surgeon Lieutenant Commander Alec Mitchell RNVR who would be responsible for our wellbeing whilst we were at Manus We lived in the nurses quarters of US Naval Base Hospital 15, which had 2 000 beds and all the back up services necessary for a large, busy hospital and a particularly efficient commissariat The food was superb! Captain Robbins the Medical Officer Commanding arranged with the US Navy Department for the RN sisters to be messed free of charge as our pay was insufficient to meet the monthly mess charges It was indeed very low compared with that of our American colleagues even though we received 'danger money' because our flight paths crossed enemy held territory

Our patients arrived at Manus from the British Pacific Fleet via a hospital ship — the *Oxfordshire* I think — and were accommodated in the USN Hospital until they were fit to travel The evening before flight they were taken by ambulance to the sick quarters at Momote Airfield on Los Negros Island and were cared for overnight by SBAs The sister who was to travel with the patients visited them there and arranged their disposal in the aircraft She then had an 0300 call and was driven to the airstrip by Dr Mitchell when equipment and victuals were checked Loading of the patients then commenced and all were safely stowed by 0530 for take off at 0600.

Those patients who required sedation received it at the sick quarters. The flight from Momote to Milne Bay (our refuelling point) took approximately four hours After a brief rest when stretcher cases were unloaded to the shade of the wings we flew on to Townsville to be greeted by the Australian Red Cross with welcome drinks of chilled fresh milk — a rare treat. Our patients were taken by ambulance to the RAAF Hospital for a night's rest before continuing to Brisbane where we were looked after in the same wonderful way as at our other stops. During the flight from Brisbane to Sydney the radio operator signalled RNH Sydney with details of patients ambulances required and of course our ETA

The aircrews were always most helpful They were usually mixed crews of RAF, RAAF and RCAF who, wanting to be in the thick of things had transferred from Europe to the Pacific.

On arrival at Mascot we found the RN ambulances and attendants waiting Then began the long drive to RNH Herne Bay where patients flight sister and SBA were only too pleased to have a rest Sister and SBA usually had a return flight about 48 hours after arrival in Sydney and on arrival at Manus were able to relax in pleasant surroundings while awaiting the next flight

Our American hosts did so much to make these waiting periods a happy and relaxed time Weekends were usually spent fishing

in the lagoon or swimming from the island which had been turned into a recreation centre A large Quonset hut had been erected with showers and a kitchen where any fish caught could be cooked The main galley of the hospital provided the most wonderful picnic food but beer and coke was provided from our own rations I recall one very interesting trip across the lagoon to a village built on stilts over the water On arrival we were greeted by the Luluai or head man of the village. He was so proud of his peaked cap! He gave me a parting gift — a large carved wooden alligator which I still treasure In his presentation speech in pidgin English he announced to one and all that "Missie from country of Big Massa King" had visited the village nursed their babies and he was making this gift to "one helluva good missie '

With a total male population of about 66 000, female company was in great demand There were only 60 American nursing officers and we six QAs and many were the phone calls from unknown men who simply wanted 'a chat with a dame

One day my friends and I were flown in a light aircraft to a neighbouring island where there was a Fleet Air Arm Station which supplied relief pilots to the aircraft carriers in the British Pacific Fleet We had a wonderful visit but were unable to return to Manus due to bad weather and had to remain overnight Gallant FAA pilots turned out of their cabins for us and even supplied toothbrushes However, our American hosts never quite believed that the weather had really prevented our return On another occasion a visit to the officers' club at Momote airstrip ended in a Japanese air raid with the island defences in action RAAF, RAF and RNZAF officers were there at the time and it is quite astonishing that I should meet up with one of the New Zealanders again in 1955 when my husband and I were living in the Gilbert and Ellice Islands Truly a small world

Margaret Harris (nee West) left above writes

The RNMAEU was formed towards the end of the second world war and operated in the last months of the war in the Pacific It had been found that both sick and wounded made a slower recovery in the tropical conditions of the Pacific islands and at sea, and so it was decided to fly as many RN patients as possible south by a safe route to the Royal Naval Hospital, Herne Bay Sydney which had only been in operation since the beginning of 1945.

At that time aircraft were not pressurised and their comparatively slow speed meant long hours at a fairly high altitude Some patients reacted adversely at 8000 10 000 feet. The RAAF had been evacuating patients from their Pacific island bases for some time and had gained enough experience to run a short course on the subject at their station at Larundel Melbourne

A notice was posted at RNH Herne Bay inviting nursing sisters to volunteer for

escort duty on the DC47s evacuating RN patients from the American Naval Hospital at Manus one of the Admiralty Islands just north of New Guinea The first team of six nursing sisters trained in New Guinea with the RAAF nurses and were then stationed at the hospital in Manus escorting patients to Sydney when required The second team trained at Larundel and relieved the first team after about six weeks

The course covered the preparation of different cases for flying and the reaction of patients to high altitudes administration of drugs and sedatives tropical medicine and hygiene loading and positioning in the aircraft and many other responsibilities For instance we would have to arrange for the wireless operator to signal ahead to the medical unit with details of the patients or it might be necessary to request the pilot to reduce altitude or even land if a patient s condition required We were also instructed in the procedure for crash landings on sea or in jungle and for survival in both circumstances and were given information on the Geneva Convention and on chemical warfare On the practical side there was dinghy drill in a pool and a simulated flight in a decompression chamber when we were subjected to the equivalent of an altitude of 20 000 feet at which point most of us found it impossible to write sensibly

On completion of the course there was an examination and a passing out parade So naval nursing sisters had to drill and march for the first time! They weren t too clever at it one girl finding it impossible to swing her arms alternately with her feet, swung both together and hoped for the best At the final march past taken by the RAAF Matron in Chief several girls managed to trip over a peg in the parade ground on the order "Eyes right" Some lost their hats in the blustery wind and the flight sergeant collected an armful

The RAAF provided a uniform consisting of khaki drill skirt and bush shirt for wear in Manus with khaki trousers for flying a fur lined jacket and cap in air force blue I believe it was the first time that RN sisters had worn trousers on duty The Surgeon Lieutenant Commander in charge arranged for the dentist to make metal badges consisting of one wing inscribed with the letters RNMAEU

Evacuating aircraft left Manus at dawn and it was a beautiful drive by jeep across the island to Momote airstrip The creepers seemed to grow across the road during the night and the land crabs were as big as dinner plates it was impossible to avoid driving over them and the crunch was horrible We refuelled at Port Moresby — this was merely an airstrip with a small hut and there was usually a group of primitive New Guinea natives curiously watching the extraordinary flying machine and its contents The plane then flew on to Townsville arriving about 1800 Here the patients were unloaded and taken to the Australian naval hospital where they were fed and cared for overnight while the sister spent the night at the WRANS quarters

Take off was at 0800 the following day refuelling at Brisbane and arriving in Sydney in the evening The crew consisted of two pilots a wireless operator a navigator a sick berth attendant and a sister The cabin was rough and bare and in addition to the stretcher and sitting cases mail bags were carried On some occasions the patients were suffering from nervous disorders as a result of war conditions but they were usually happier playing cards around a

suitcase than being sedated with nembutal

The time spent in Manus waiting for evacuees was tedious and very hot We were treated as guests in the hospital mess because the American Commanding Officer thought we earned so little and shared comfortable quarters with American naval nurses waited on by Manus native servants These girls of mixed island descent were quite overwhelmed by the sudden blast of civilisation that had struck their otherwise peaceful and backward lives One girl was known as Half leg having sustained a serious injury to her foot when a clam closed on it while she was paddling She dyed her hair bright yellow with mepacrine while her friend used the more attractive gentian violet

White women were only allowed to leave the hospital compound in pairs and with at least two male armed escorts so excursions for swimming or picnics were limited to the escorts free time Willingness, however was certainly not lacking In fact the ratio of 40 white women to several thousand service men British American and Australian made the Saturday evening dances a little overpowering After the very first flight the duty sister reported to the SRA Sydney and mentioned that she was missing the farewell party at Manus He promptly sent her back to attend

Only a dozen or so sisters were involved in this work The end of the war came unexpectedly after the first hydrogen bomb was dropped on Japan in July 1945 and evacuation continued only until September

It was perhaps not surprising that following the end of hostilities with Japan our Australian flying crews became rather casual one return flight departure from the RAAF airstrip in Sydney was delayed because the aircraft had been mislaid It was finally located behind a tree but the incident did not help to instil confidence in those of us waiting to embark

But all through the period of naval air evacuation the Australian crews were like guardian angels They came to our rescue on many awkward occasions and are remembered with great affection and respect

Struck by Lightning — The Effects upon the Men and the Ships of HM Navy

H. Cannell

Part 3 Varieties of Strikes on Men.

Modern knowledge[1] suggests that the many cases of death and injury from lightning strikes to the men in the Fleet could have occurred in four separate ways. These varieties of a strike by lightning are said to be the direct strike, contact voltage, the side flash and step voltage.

The Direct Strike

This form of strike must have involved those whose job most exposed them to lightning by their duties as topmen of the great masts of sailing ships. Very many instances, recorded by Snow Harris [2] after diligent researches of ships' logs show that men were charred and roasted by lightning striking them whilst at or near the top of a mast. Those not left on fire and hanging in the rigging were thrown down to the deck or clear overboard. Death was usual and only those who escaped the full power of the discharge of lightning lived.

Sometimes the lightning did not strike at the masthead but hit the ship or men from an angle nearer to the deck level. *HMS Sultan*, 74 guns, was moored at Port Mahon on August 12, 1808. The men were in the act of furling and stowing the jibs when lightning struck. Two men, Robert Symons and John Wright, were lost overboard. Alexander Jackson, Francis Carr, Charles Langford, Cornus Marie and John Smart who were standing on the jibboom and the bowsprit were killed instantly. This one lightning strike killed seven men and injured three more, yet it hit them when they were relatively near deck level.

An external flashover[1] of the current from parts of the body to the clothes may occur during the very short time that a direct lightning strike is being discharged through a man. A very unusual case of a survivor of a strike with flashover was a seaman at the crosstrees of HMS *Racehorse*[3] in 1849. Although described as being only slightly wounded after the strike, he also had all his clothes torn off by the discharge of lightning. This must have occurred because the moisture on him and his wet clothes became superheated by the electricity. The resultant sudden head of steam then blew his clothing off.

Contact Voltage

As the name implies, the electrical current from a lightning strike may pass through a man if he is touching a metallic conductor which is itself of poor electrical capacity and through which the lightning is discharging to earth.[4] The old type of chain conductors were responsible for many accidents of this type. One such was in a USN ship on the Mississippi near New Orleans in 1808.[5] The chain conductor was just being put up when a lightning flash hit it, broke and melted the chain and killed three sailors who were handling it (fig. 1). Lightning often hit the iron pendant stuffs at mastheads, chains at deck level or metal

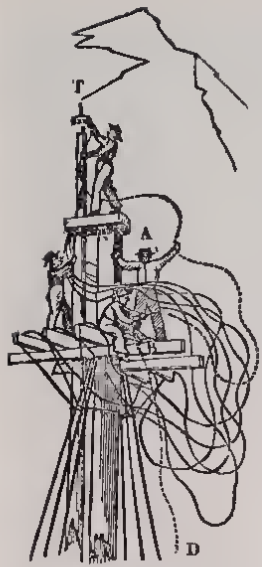


Fig 1 USN ship struck by lightning in 1808 Three of the four men handling the chain conductor were killed (Illustration from Thunderstorms by W S Harris)

rigging for the masts If a seaman was touching any of these metallic bodies at the time lightning struck he too received the current through him usually with fatal results

Side Flash

The side flash may occur when lightning strikes a poor conductor such as a wooden mast or spar [1] A man in the rigging or on deck near to the mast when it is being struck by lightning may become victim of a side flash of the current because the electrical breakdown strength of the air gap between mast and man is exceeded Jack Johnson a seaman onboard *HMS Active*[2] was killed in this way in 1802 Lightning struck the wooden mainmast rao down to deck level and then flashed over to the pumps next to where Johnson was cutting up meat Although his skin was not cut or blasted open all his bones were broken and he was blackened all over Similar accidents on land usually involve a person standing next to a tree when sheltering from a thunderstorm

The pumps, which comprised a large mass of metal seemed to attract side flashes regularly As many as sixteen men at a time were recorded as being injured in this way Below decks lightning flashes have jumped from gun to gun to muskets to iron galley pots to hammock hooks and to metal of every sort[2] Where men were grouped closely together above or below deck it is possible for a side flash to have passed from one to another If the groups of men were in the rigging and one was hit by a direct strike the remainder may have constituted a human lightning conductor whilst the current was passing Since the human body behaves like a homogeneous gel to the passage of lightning and has a resistance of about 1000 ohms,[2] then sometimes the discharge took place through groups of seamen in preference to the mast or wood of the ship which had an even greater resistance

Step Voltage[1]

If a lightning strike goes to earth near to where a person is standing the potential difference between his two feet may sometimes be enough to give him an electrical shock This is known as a step voltage shock and presumably was more likely to occur if a seaman braced against

the rolling of the ship was standing with a wide stance If one man was struck by lightning whilst on deck groups of others some distance away were nearly always knocked down and in some cases paralysed in the lower limbs Since there was little likelihood of the current passing through the vital centres of the medulla or through the heart most were injured or paralysed for a time rather than killed by step voltage shocks *HMS Lowestoffe*[2] for example was struck by lightning for the third time in a quarter of an hour in March 1796 The lightning is said to have affected the men below decks to various degrees and benumbed the majority of the crew

When lightning struck *HMS Topaze*[2] off the West Indies in 1802 fifteen men were injured One of them was a Reverend Dr Scott who was on passage at the time He was doubly unfortunate for not only was he hurled to the deck but he was also blasted by the explosion of two powder horns of gunpowder touched off by the lightning Whilst injuries were common death was rare from shocks induced by step voltages

Medical Complications in Retrospect

As has been seen the consequence of three varieties of lightning strike direct contact and side flash was usually death Presumably respiratory or cardiac arrest occurred to those struck and the circumstances of a broken or shivered mast or the rigging on fire meant that there was no opportunity for prolonged attempts at resuscitation Yet modern research has shown that ventricular asystole or fibrillation may not always be the direct consequence of a lightning strike discharged through the chest The time over which a lightning flash discharges to earth has been shown to be less than ten milliseconds Even though the current may be enormous there may not be time for complete depolarization of all cardiac nervous pathways Survival is therefore possible and has been reported[4] the survivors suffering a loss of consciousness with a flaccid paralysis Certainly very many instances of both long and short term paralysis occurred in seamen hurt by lightning in HM ships Many who did not recover fully were afterwards invalided from the Navy It is not always certain from the records of the time whether it was common for survival to follow other than what must have been step voltage type shocks. In the medical literature there have been rare reports of recovery after apparent death from more direct lightning strikes

The only two way street to heaven[5] was the author's description of the state of suspended animation that occasionally follows a direct discharge of lightning to the human body One such case that involved a sailor occurred in *HMS Wasp* in 1814[2] After lightning had struck the ship and presumably the man his dead body is said to have remained warm for two days Although it was not stated whether an attempt to resuscitate him was made it is just possible that if carried out at once such an attempt may have been successful The possibility existed because we now know that the onset of degenerative processes may be delayed after a person has been struck by lightning[5] The deduction that can also be made now is that resuscitation after lightning strikes should always be given even to the apparently dead

Cases of blindness presumably through corneal scarring deafness possibly due to the blast effect of a lightning strike paraplegia[7] due perhaps to oedema of the spinal cord were but some of the injuries suffered by seamen in ships struck by lightning Nowadays we also know that prolonged changes in the ECG trace may be the sequel of a severe shock from lightning The Q T interval is lengthened and there are negative T waves in leads II and III[1] Cerebral oedema now accounts for the loss of consciousness and some neurological

Fig 2 *HMS Hussar struck by lightning in 1796 off the Scilly Isles The ship was set on fire left a mere wreck and many seamen were disabled Under jury rig she eventually was brought into Portsmouth*

signs Although partial alopecia has been recorded in both sailors and civilians who have been struck by lightning there remains no satisfactory explanation for this latter complication

Lightning Protection for Ships in Modern Times

Despite William Snow Harris efforts to publicise the long list of missing ships and injured and dead seamen the lessons of efficient protection from lightning were soon forgotten The use of iron then of steel masts made RN ships less vulnerable to strokes of lightning The all metal hull propelled by steam engines rather than by the wind soon made the need for earthing of masts apparently obsolescent Merchant fleet owners seized upon the cheap but inefficient wire rope as a means of ensuring that a lightning conductor of sorts was fastened to wooden masts but sometimes continued to ignore the need for protection from lightning altogether

As late as 1903 the lessons that had been forgotten were again learnt The iron hulled liner *Teutonic*[8] was off Newfoundland when her topmast was struck by lightning The topmast although made of wood was completely unprotected When lightning struck it the mast was broken into pieces and the halliards were driven into the lower mast of hollow steel

The Navy continued to republish their directions for protecting wooden masts flagstaffs and ships in dry dock from lightning and these directions were still in use in 1924 [9] Some of the original standards eventually adopted by the Navy after great losses of men and ships (fig 2) are in the current Lloyds rules [10] where it is stated that lightning conductors are to be fitted to each mast of all wooden ships composite ships and in steel ships having wooden masts or topmasts

Lightning strikes can be involved in the

loss of all metal ships The *Kriti Sun* [11] a 61 000 ton Greek motor vessel exploded after lightning had ignited oil fumes in her empty tanks This occurred in Singapore in October 1975

Modern yachts seem mostly to be unprotected the widespread use of metal masts being thought to be more than adequate to discharge a strike by lightning Yet unless that mast together with any large metal mass such as an engine is well bonded to an earthing plate one foot square under the waterline accidents from lightning can still occur

A trimaran[12] with an aluminium mast was struck by lightning when anchored in Pioneer Bay inside the Great Barrier Reef in January 1972 The hole made by the current was seven inches by four inches and was in the main hull below a projected line from the base of the mast In addition there were two smaller holes on either side of the transom just below the back stay chain plates and the whip aerial had disintegrated The yacht was saved by running her ashore

One yachtsman's Folkboat[13] escaped unharmed when struck three times off Malta His boat had a metal mast in a wooden hull but the mast was probably well earthed Lohman[13] advises that yachts with metal rigging will be adequately protected provided that all the rigging is earthed

The modern method of building yachts with non conducting hulls and with unearthed masts stepped into cabins or decks cannot provide an adequate conductor to discharge lightning strikes Perhaps, as in the days of wooden warships some of those yachts that disappear without trace have been struck by lightning

Concluded

Acknowledgements

I am pleased to acknowledge with grateful thanks the advice and cooperation of Dr R J B Knight and Mr N Upham of the National Maritime Museum Library Greenwich Mr D Gernsey and Mrs E Symons of the Library of the Institution of Electrical Engineers London the Chief Librarian and staff of the Naval History Library Ministry of Defence London the Chief Librarian Royal College of Surgeons of England London and the staffs of many other libraries and archives The illustrations were photographed by Mr G Walter of The London Hospital Medical College I am most grateful to him and to his staff

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BOOK REVIEWS

RECENT ADVANCES IN MEDICINE 17th edition Edited by D N Dixon N Compston and A M Dawson Pp 473 Churchill Livingstone £9 50

It is unnecessary to commend the latest edition of such a valuable and well established publication Once again the bewildering advances of the previous five years have been summarised in a series of masterly monographs Eighteen topics are covered each of them having been areas of progress controversy or new and fundamental biological understanding during the 70's

Once again the editors must regret have been postgraduate students urgently pursuing clear information and busy consultants trying to remain well informed Once again they can be sure that one is grateful for a series of lucid expositions on disparate and complex subjects

One is perhaps also reassured to find that despite the totally unmanageable volume of world literature most of which we have all missed or skimmed or misunderstood things have not changed that much The important advances in knowledge are limited in number and manageable in concept so that one can take undaunted pleasure in the process of updating which this volume offers Moreover each section concludes with a comprehensive bibliography thus allowing detailed exploration in areas of particular personal interest

Every chapter has its particular compulsion Thus the three on the treatment of Hodgkin's disease non Hodgkin's lymphoma and acute leukaemia present a quietly objective account of what is in fact the triumphant outcome of massive and sustained endeavour Then the slow viruses and the CNS are elucidated in a fascinating account of comparative pathology and virology — a detective story still only half told On to hepatitis and VD the former not after all very different since HBsAg the latter still clinically protean and repeatedly missed and both new in the shadows of Sodom and Gomorrah

All of us not directly involved in it will be glad of the latest word on surgery for coronary heart disease and equally grateful to discover that hypertensive crises are not in fact incomprehensible although tantalisingly elusive in their precise aetiological relationship to vascular disease and in their relevance to prophylaxis and treatment Not as it turns out are the prostaglandins mysterious but rather physiologically revealing pathologically clarifying and therapeutically promising And so on

We could all enroll from personal instinct extensions or inclusions For example why disease treatment in the uterus in the 1980s when secure but fertility is the world's most despairing need? But these are carping quibbles *Recent Advances in Medicine* again earns our gratitude It is hard to imagine how earlier physicians managed without it Long may it continue

TRWH

LUNG FUNCTION — ASSESSMENT AND APPLICATION IN MEDICINE J E Cotes Fourth edition Pp 605 Oxford Blackwell Scientific Publications £26 50

This publication which first appeared 15 years ago has retained its place on both sides of the Atlantic as a standard bench book for physicians and scientific workers who have a special interest in lung function This new edition has been extensively revised and includes recent developments in respiratory physiology which ensures its comprehensive coverage of the field

Whilst many parts of the book are unsuited to the novice It provides a source for reference values for novices in receipt of pulmonary physiological data and contains a valuable chapter on the uses and interpretation of lung function tests The extensive bibliography is usefully classified into sections according to subject matter

A mark of the book's status is its conspicuous presence in almost all respiratory function laboratories and on the office shelves of distinguished pulmonary physiologists

JMB

A SHORT TEXTBOOK OF MEDICINE J C Houston C L Joiner & J R Tronson Sixth edition Pp 661 London Hodder & Stoughton £5 45

The first edition of this excellent little textbook was published in 1975 and reprinted with revisions in 1977 It is an indication of the continually changing and advancing pattern of medicine that a completely new and extensively revised edition has again been published in 1979

Besides the three authors eight other eminent specialists have contributed to the work and each section has been brought up to date Particularly appreciated the thoughtful and concise manner in which the section on cardiovascular disease had been rewritten

This textbook is not intended as a work of reference but rather as an efficient working and companion It is primarily aimed at medical students but is still of value to the trainee physician It is eminently readable and sets out the basic facts of medicine in a sensible coherent and concise way Greatly to be recommended

AMH

COMMON DISEASES — THEIR NATURE INCIDENCE AND CARE John Fry Second edition Pp 413 Lancaster MTP Press Ltd £9 95

In an age where doctors and medical students are almost submerged under the ever swelling surge of highly detailed but not always highly readable medical literature it is always refreshing to find a publication which is straightforward unpretentious and enjoyable John Fry's second edition of Common Diseases is such a book Based on three decades of working experience in general practice it does not attempt to claim to be a standard book of reference for those seeking the most recent developments in treatment or therapeutics — Fry has referred for these needs elsewhere Rather it sticks to its task of clearly cataloguing and deftly describing those disease entities most frequently met in everyday practice

Of course among the strengths there are weaknesses For example Section VII Obstetrics & Gynaecology I was disappointed to find only a passing reference to contraceptive while nowhere could I find the words family planning two subjects on constantly encountered in general practice Similarly Section X Skin Disorders surely merits slightly more than a somewhat cursory scratch of the surface

However in an writing one is in danger of disregarding the admirably honest aim of the author For the medical student it provides a window through which he or she can have an introductory peek at but intimidating at the size texture and complexity of both the medical and social content of primary care For the experienced doctor in whatever branch of medicine, this book will not only remind that a holistic approach to patients is still entirely appropriate but will also help to rekindle perhaps semi dormant awareness of the current state of health within our community A most useful addition to any's working library

AMcE

DERMATOLOGY FOR THE PHYSICIAN — AN ILLUSTRATED GUIDE E L Rhodes Pp 104 London Baillière Tindall £8.50

From the title one hoped that at last a guide to dermatology might have been written with the MRCP candidate in mind Alas this is not the case for the book is no more than a very basic introduction to the subject The term Physician has obviously been used in a wider context than is generally applied to this country

Dr Rhodes states in her preface that her aim is to provide numerous clear colour pictures with notes on the diseases and their treatment Although some of the illustrations are excellent the use of multiple lateral plates makes many of the photographs too small for clarity and imposes an irritating requirement to constantly turn away from the text in order to find the appropriate illustration The text is written cleerly and concisely but the material provides many examples of unbalance particularly if one continues to feel that the book has been written with the physician in mind Thus disease entities which might be considered important such as Dermatitis herpetiformis and Pyoderma gangrenosum are accorded scant attention whilst relatively large amounts of space are devoted to conditions such as the dog mycoses and plague which are not only extremely rare in this country but are adequately covered in non dermatological texts

Dr Rhodes is well known for her enthusiasm for

fibrinolytic therapy and such treatment is given prominence in the management of scleroderma (both cutaneous and systemic) necrobiosis lipoidica and even stasis ulceration The use of such agents in these conditions is based on anecdotal experience and their value has not been confirmed by good clinical trials and would be disputed by most dermatologists Most of us would also seriously question the advice to use systemic corticosteroids in erythroderma or generalised pustular psoriasis alongside create and question the statement that Eusol should not be used for cleaning ulcers as it prevents epithelial cation

Excellent and relatively inexpensive alternatives to this book are already available and with these in mind one hesitates to recommend it to one's colleagues, particularly if they really are physicians

MDC

LIPIDS A CLINICIAN'S GUIDE Leon A Simon and Joyce Carey Gibson Pp 84 Lancaster MTP Press Ltd £7 50

This useful and very readable handbook meets the authors aim of providing a practical guide on lipids for all clinically orientated doctors

After discussing the clinical implications of hyperlipidaemia and in particular its role as a risk factor in atherosclerosis it poses the question of whether risk factor intervention is worthwhile The rather conflicting evidence of the benefits to be derived from lipid lowering regimes are reviewed It is concluded on the cheerier that although the benefits are not as clearcut as stopping cigarette smoking or correcting hypertension reduction of high lipid levels is beneficial provided patients are selected carefully and treatment regimes are pursued realistically Cholesterol lowering diets are associated with lower mortality rates for coronary heart disease except in patients over the age of 65 or those who have already had a myocardial infarction Lipid lowering drugs give a reduction to near fatal re-infarction rates but in diets have had no effect on mortality These effects are only found if a substantial reduction in lipids is achieved and treatment should be changed or discontinued if this does not occur The confusion generated by various classifications of hyperlipidaemias according to different laboratory methods of chemical and physical estimations is overcome by simply considering hyperlipidaemia to fall into three categories ie Hypercholesterolaemia Hypertriglyceridaemia and Combined Hyperlipidaemia This classification is all that is required for the management of the vast majority of patients

An eminently sensible Seven Point Guide to Management is given in the chapter on treatment The need to correct obesity in all patients is stressed and the value of the dietary approach is discussed Drug therapy and the correct usage of the drugs available are outlined in a straightforward readily understood manner The possible hazards of drug treatment for example the increased incidence of gallstones and an indication of an increased risk of gastrointestinal neoplasm with Clofibrate are pointed out which is a further reason for the careful selection of patients before initiating treatment with drugs

This guide presents the background information and rationale for selection of patients for treatment in a format that can be applied in practice by either general practitioner or general physician

ARM

COMMUNICABLE DISEASES Wilfred H Parry Third edition Pp 252 Sevenoaks, Hodder & Stoughton £3 95

It is ten years since the first edition of this book was published As before Dr Parry has produced a volume that is easy to read and of value to both nurses and doctors be they qualified practitioners or students The enlarged introduction with its delineation of the role of Medical Officer of Environmental Health (the successors to the Medical Officer of Health) and the new Communicable Disease Surveillance Centre at Colindale are of particular interest to all but the most recently qualified

This book does not pretend to be a comprehensive treatise but highlights and puts into perspective the subject as it affects Western Europe Its layout is logical and coverage ranges not only over the more mundane measles and mumps common cold and influenza but also Legionnaire's disease and Lassa fever More than adequate references are given for the non specialist reader The chapters on the Zoonoses Common Immigrant Diseases and Selected Tropical Diseases are doubly welcome in these days of much ill informed television coverage and easier travel to and from the more exotic and distant points on the world's surface

Three appendices on the role of the nurse in vaccination port health and control of communicable diseases in schools give a very useful summary of official advice and legislation on these topics

A valuable reasonably priced tome for the bookshelf of all who come into or may come into contact with communicable disease problems

TPO

PRINCIPLES OF IMMUNOLOGY Edited by N K Rose F Milgrom and C J van Oss Second edition Pp 543 London Baillière Tindall £9 50

This book written by a team of contributors from The Center for Immunology State University of New York at Buffalo gives an excellent introduction to the principles of immunology Its information is well presented and adequately illustrated References are not given in the text but a bibliography is given at the end of each chapter

This is the second edition of a book first published in 1973 and has required extensive revision in keep pace with the rapid progression of immunology The book is divided into three units the first is devoted to the basic principles of immunology and contains the newest knowledge of cellular interactions and genetic regulation The second unit of the book contains chapters on applications of immunology to clinical diseases Applications of immunology to diagnosis and therapeutics are dealt with in the third unit This final unit is much shorter than the previous two and perhaps does not penetrate deeply enough into the many applications of immunological techniques Certainly a thirst for these applications will have been quenched by reading the first two sections

This book is well recommended to undergraduates and postgraduate beginners in immunology

NFL

LUNG SOUNDS. Paul Forgacs Pp 72, London Baillière Tindall £1 95

Dr Forgacs papers presented with the aid of tape recorded lung sounds have greatly entertained audiences at several chest meetings during recent years. His unique book has now gathered together and expanded the content of his previous short publication in this field

Since the earliest descriptions of sounds heard during chest auscultation terminology and interpretation have been both variable and imprecise Lung Sounds is the first attempt to make a scientific analysis of the genesis and meaning of noises heard over the lungfields It is therefore not surprising that it represents a rather uneasy alliance between scientific fact and unproven conjecture For these reasons the book is entertaining and provocative and worth the attention of all clinicians

The book will undoubtedly popularise the present healthy trend to use simple English terms such as crackles and wheezes to describe sounds heard through the stethoscope It will also provide fresh impetus to the examination of physical signs generally by chest physicians at a time when radiology has diverted attention from clinical appraisal

JMB

A GENERAL TEXTBOOK OF NURSING Evelyn Pearce 20th edition Edited by James P Smith and Patricia A Downie Pp 404 London Faber & Faber £6 95

This is a textbook which has retained its position among the top general nursing books since its original conception Two recent editions has been well updated with some clear well situated diagrams and pictures but at the same time maintains some traditional continuity with the past

The short concise paragraphs are easy to read and the headings make for quick reference There is a feeling that the brief coverage of so many subjects is detrimental to the amount of nursing information which could have been given The index and bibliography are comprehensive and the revision questions have generated nursing content

A major criticism is the way the book handles it does not fell open easily making use of the book during study difficult. The print is small and tightly bound so that why Virginia C Henderson was asked to do the foreword

A useful addition to any School of Nursing library and I should certainly be drawn to the attention of all students and pupils

EMN & LJH

THE FABER POCKET MEDICAL DICTIONARY P A Riley and P J Cunningham Revised by Elizabeth Forsythe Third edition Pp 414 London Faber & Faber £1 50

This little book contains not only a concise explanation of most common medical terminology but also some good illustrations, drawings and useful appendices Of the latter the most striking is the weakest in that it is not up to date on a number of topics and too often fails between a compressed pharmacology textbook and drug manual The book will however be useful to those at school or assessed — nurses paramedical staff and the uninitiated layman

DV

LEAD — AIRBORNE LEAD IN PERSPECTIVE. National Academy of Sciences Washington D C Pp 330 Stemlord Lines Scientific Era Publications £6 25

This volume is an assemblage of contributions by a number of American experts on aspects of lead pollution prepared by the National Academy of Sciences for the Environmental Production Agency in connection with their programme for the control of atmospheric pollutants The report reviews available scientific knowledge on the significance of lead in the ecosystem and the environment generally with particular reference to the biological effects on man and with chapters on these aspects in plants and animals As may be expected from the preponderance of biologists on the Committee and Panel no lead the report deals with the biological aspects very comprehensively whereas consideration of non biological aspects is relatively brief

Most of the report is devoted to a detailed study of these biological effects commencing with a dissertation on the origins of lead pollution and its distribution concluding with a very useful summary of the evidence together with conclusions and a chapter devoted to recommendations for research many of which could be undertaken in the United Kingdom with advantage There then follows an excellent series of appendices dealing with particle size sampling and analytical methods for lead a useful table of data relating blood and lead content to daily lead assimilation at two levels of lung retention and storage of biological samples Last but by no means least is an appendix on the treatment and costs of lead poisoning in man a similar dissertation on cattle and a very full glossary of terms used throughout the book

Lead intoxication occurs in patients of all ages and personal circumstances and is a unusual hazard in a number of occupations This book should therefore be of interest to clinicians generally whilst to those practising Occupational or Community Medicine and related research it will be essential reading Whilst much of the text is of particular relevance to circumstances prevailing in the USA the arguments are of universal application and the excellent references section listing 600 relevant publications includes most of the important British papers Coming at a time when interest in lead pollution is at a high level this volume should be widely read and thoroughly deserves a place in every medical library

JDW

DERMATOLOGY J S Pegum and Harvey Baker Third edition Pp 278 London Baillière Tindall £4 95

The choice of short text books of dermatology for the undergraduate or non dermatological postgraduate is considerable and it is probably fair to say that in its previous two editions this book had not been a particular favourite However two well respected dermatologists one of whom is Civil Consultant in Dermatology to the Royal Navy have now almost completely rewritten the text This book is one of the popular series of *Concise Medical Textbooks* and one feels that in its current edition it compares very favourably with some of the other well known titles

A criticism which can often be levelled at dermatology textbooks is that their therapeutics sections tend to be imprecise and consequently unhelpful in practical terms It is thus refreshing to find a book from which the reader can extract the actual drug (and dose) or local application appropriate to a particular disease This is of paramount importance to the non dermatologist who generally finds the therapeutic armamentarium highly confusing

The text is fluent easy to read and obscure jargon is kept to a minimum Although most illustrations are for the sake of economy in black and white their quality is generally good and one particularly appreciates the proximity to the relevant piece of text. A section containing twelve good quality colour plates has also been included to illustrate selected conditions

Several minor criticisms can be levelled at what is generally an excellent little book in the chapter dealing with Principles of Treatment it was surprising to find topical steroids omitted from the section "Specific Drugs Used Topically" Although outlined in the Appendix in quite practical way one would have preferred them included in Chapter 3 together with details of their potential side effects In a book where space is obviously at a premium it was rather odd to find two descriptions of chronic paronychia The condition is quite adequately described on pp 91 92 with other accidental infections but again on p 250 where its omission might have allowed space for discussion of other nail dystrophies which have been neglected

Other minor criticisms could be mentioned but it would be unusual to find oneself in total agreement with a book of this size which is necessarily dogmatic Drs Pegum and Baker have largely succeeded in producing a neat little package and I would have no hesitation in recommending this book to anyone seeking a practical and sensible introduction to dermatology

MDC

SERVICE NEWS

OBITUARIES

SURGEON REAR ADMIRAL (D) W L MOUNTAIN CB OBE LDS RCS Director of Naval Dental Services 1954-60 died on February 19 1980 in hospital at Tunbridge Wells

Surgeon Rear Admiral (D) W L Mountain CB OBE LDS RCS

William Leonard Mountain was born on February 25 1908 at Cowes IOW the son of a local dental surgeon He was educated at Sherborne College whence he proceeded to Guy's Hospital and qualified LDS RCS (Eng) in 1931

He began his career in practice with his father but developed an irresistable urge to cross the Solent to join the Royal Navy He was entered as a Surgeon Lieutenant (D) and joined RNH Haslar on September 4 1933 He was soon appointed to the battleship *Royal Sovereign* and then to *Romulus* in which he served 1935-37 During the war he served in the battleships *Duke of York* and *Rodney* the cruiser *Glasgow* and the depot ship *Woolbrook*.

After the war he was selected to be assistant to the Director of Naval Dental Services which enabled his meticulous attention to detail to be used to the benefit of the Dental Branch in the post war reorganisation His undoubted administrative abilities and sound commonsense in the pursuit of the possible made a great contribution to the improvement in the design and equipment of dental surgeries both ashore and afloat in a period of rapid change and development For this work he was awarded the OBE in 1953 Later as Command Dental Surgeon Portsmouth he was influential in the provision of greatly improved dental departments in shore establishments These set a new higher standard to be followed throughout the Navy He was tireless in his efforts to improve the training of dental personnel

Admiral Mountain's distinguished career was acknowledged by his being appointed QHDS in 1961 Director of Naval Dental Services in 1964 and being made CB in 1966 He retired on February 29 1968 He was a keen gardener but his best loved recreation was golf which he played with consummate skill and steadiness

Our sympathy is extended to his wife Glenda and daughter Elizabeth in the loss of a devoted husband and father Their loss is shared by his colleagues and friends who knew him as a staunch and cheerful character and a dedicated servant of the Royal Navy in which he served with great credit to himself and to his profession

SURGEON CAPTAIN A W GUNN MVO MB ChB RN Retd died at Kettering Northants on April 1 1980 at the age of 89

Alexander Gunn qualified in Edinburgh in 1915 and later that year entered the Royal Navy as a Surgeon Lieutenant He was promoted Surgeon Lieutenant Commander in 1921 Surgeon Commander in 1927 and Surgeon Captain in 1941

After a short spell at RNH Chatham he joined *HMS Jnne* and saw action with the Naval Landing Parties in Persia Other appointments included *HMS Carnarvon HMS Flinders* (on surveying service) RNH Malta and *HMS Pembroke* (for RM Infirmary Deal) In 1929 he was lent to the Royal New Zealand Navy and served on HM Ships *Philomel* and *Diomede* being appointed Squadron Medical Officer in 1931 He returned to the RN in 1937 to serve with the 5th Submarine Flotilla at Fort Blockhouse In 1935 he was awarded the MVO and his final appointment prior to retirement in November 1947 was as Staff Medical Officer to Commander in Chief Portsmouth

Off duty Captain Gunn was a keen golfer a great fisherman from Scotland to New Zealand but his

particular pride were his Rugby International caps for Scotland in 1911 12

He is survived by a son also a doctor to whom we extend our sympathy

SURGEON COMMANDER JAMES DOW MB ChB DPH RN Rtd, who died on December 27 1979 (JRNMS Spring 1980) graduated from Aberdeen University in 1937 He entered the Royal Navy as a Surgeon Lieutenant in 1939 and served on the minesweeper *HMS Gossamer* during the Dunkirk operation. This was followed by a spell on *HMS Victorious* on Russian convoy duty. He was promoted to Surgeon Commander in 1952 and his final appointment was as Principal Medical Officer *HMS Caledonia* from whence he retired in 1965 to join the public health service in West Lothian

Rear Admiral Desmond Callaghan CB writes

After I had been at *Caledonia* for about six months and the severe winter of 1962-63 was gradually relenting Bill MacLaren my PMO came into my office one Monday morning Following the Irish Scottish International at Murrayfield wearing a grave face. This was unusual because we always attended the matches together and held a lengthy and animated post mortem on the Monday after as there seemed no cause for gravity but he quickly announced that he was to be retired in a month's time and it was suggested by MDG's department that his replacement be James Dow James Dow he said had a reputation for being obstinate and outspoken! As I got to know James subsequently I came to interpret this as totally straightforward in his dealings and true to his convictions I guessed at the time that being older than most of us he might be somewhat irrelevant of younger Captains and Commanders In this I was proved correct and having accepted his appointment with the Medical Department a month later I welcomed him to *HMS Caledonia* and back to his native land I never made a better choice Full of youngsters under training *Caledonia* had a sizeable and lively sickbay cum hospital which had to deal with every type of sickness accident and obscure disease known to youth and James took it over with great enthusiasm bringing all his skill and experience to bear He was quite expert at dealing with malingerers around exam time, his remedy being total starvation until surrender! Strict and meticulous in his administration his staff respected and revered him for his high standards and his kindness and gentleness of heart as was evidenced by the fact that they all called him 'Uncle James' As for me I would not attempt to assess his technical skill as a doctor but I know he never let me down nor dealt with any case other than wholeheartedly and with complete dedication far beyond the commonplace.

James may have been intolerant of some of his contemporaries but he certainly was with the young and as all the officers and trainees were years younger than he he decided to be a father to them all And he didn't risk being thought an old bore but went out and did things — he was very much a man of action He could be seen refereeing rugby matches in all weathers which in Rosyth is saying something he was a very capable swimming coach and was perfectly at home on the athletics field or shooting range. In addition, he played golf with me regularly and even squash on occasion

Tempest Hoy who was Commander at the time reminded me of the famous *Caledonia* 50 mile walk organised on a spell of bad weather to keep everybody fit and amused James at the age of 55 and some six years older even than his Captain completed the walk in total silence and with a menacing scowl engraved on his face He was probably last home I cannot remember but he was going to compete with the youngest even if it killed him Tempest tells me that his 13 year old daughter Caroline offered him food on the way but was almost blasted off the road! But Frances his wife won his heart for a brief second about ten miles from the end by giving him a bar of plain chocolate (none of the milky stuff!) and a large slug of brandy!

About three years ago I was James' guest at the medical officers' dinner He turned to me during the speeches and said 'Do you know Desmond the MDG wasn't even in the Navy when I retired from it I must be getting old' James was indeed an unforgettable character he was also a fine man and no grovelling lion ever had a softer or more generous heart. I wish I had met him when I was a Lieutenant instead of when I was a Captain

SURGEON COMMANDER (D) H J LUCK LDS RCS (Eng) RN Rtd died in Jersey Channel Islands on April 11 1980 at the age of 85

While a student at Guy's during World War I John Luck served with the Army in France where he was wounded in the knee He then returned to quality and entered the Royal Navy as a Surgeon Lieutenant (D) in 1921 He was placed on the retired list in 1943 re-appointed and released on completion of retained service in 1958 His appointments included *HMS Vivid Warspite Malaya* and *Rodney* and during World War II he served as Fleet Dental Officer Mediterranean He is survived by his wife son and daughter

Surgeon Captain (D) A Lowrey OBE RN Rtd writes

I mourn the passing of John Luck who was a loyal colleague when we served together on the Active List and who remained faithful to the end by letters from his home in Jersey He was a dedicated member of his profession keeping abreast of new techniques as they came into being Quite apart from dentistry he fashioned artificial eyes which were marvels of exactitude.

John was a popular messmate and my earnest wish is that he is enjoying a peaceful communion under the supreme command of le bon Dieu

We have just learnt of the death of **SURGEON COMMANDER (D) J L EDMONDS, LDS RCS,** in Malta in January 1980 at the age of 57

John Lewis Edmonds entered the Navy as an Acting Surgeon Lieutenant (D) in 1953. His appointments included *HMS Theseus Albion Terror, Gelderen* and *St Angelo* where he was Senior Dental Surgeon from 1965 to 1967 He was placed on the retired list at his own request in May 1972

RN MEDICAL AND DENTAL OFFICERS

HONOURS & AWARDS

Queen's Birthday Honours 1980
Companion of the Bath
Surgeon Rear Admiral (D) B Rogers

Queen's Honorary Physician
Surgeon Rear Admiral R J W Lambert

Queen's Honorary Dental Surgeon
Surgeon Captain (D) R L Travis

HIGHER QUALIFICATIONS

Surgeon Captain H G Knox — MFOM FFCM

Surgeon Captain M Hatfield — MFOM

Surgeon Commander J M Beeley — FRCP

Surgeon Lieutenant Commander N F Brayley — FRCS(Eng)

Surgeon Lieutenant Commander D A Evans — MRCGP AFOM

Surgeon Lieutenant I C Grant — FRCS

Surgeon Lieutenant N A Millen — MRCP (Edin)

Surgeon Lieutenant McEwan receives the Queen's Commendation from Rear Admiral R R Squares Flag Officer Submarines

COMMANDER IN CHIEF'S COMMENDATION

Surgeon Lieutenant A J H McEwan,
Royal Navy
HMS Dolphin

On the afternoon of Tuesday 27 March 1979 a rating was undergoing routine training at the Submarine Escape Training Tank HMS Dolphin. When he surfaced from an 18 metre buoyant ascent he lost consciousness and was placed in the decompression chamber with a Petty Officer and accompanied to 50 metres. A short while later Surgeon Lieutenant McEWAN Royal Navy was locked into the chamber and for the next 48 hours with the assistance of the Petty Officer he provided continuous medical support and care in extremely restricting and uncomfortable surroundings. His dedication to the task in the close confines of a chamber with its associated problems of narcosis and decompression and with outside advice available only by sound powered telephone demonstrated the highest standards of medicine and dedication which undoubtedly saved the patient's life.

I commend Surgeon Lieutenant McEWAN for his selfless actions his devotion to the task and his medical skill which were not only instrumental in saving life but were in the finest traditions of the Service.

J EBERLE
Admiral

THE HARVEY FLETCHER PRIZE FOR DENTAL OFFICERS

Surgeon Rear Admiral (D) Brian Rogers the retiring Director of Naval Dental Services presents Surgeon Lieutenant Commander (D) Geoffrey W Myers RN with the first of the triennial awards from the Harvey Fletcher Prize Trust Fund. The award consisting of an inscribed silver medal (a replica of the reverse side of the prewar dental London Basiar Examination Gold Medal) and a cheque for £100 was made in recognition of Surgeon Lieutenant Commander Myers achievements in enhancing the reputation of the RN Dental Services in particular while serving in Hong Kong and Naples.

The Harvey Fletcher Prize Trust Fund commemorates two distinguished RN officers. The first Fleet Surgeon Christopher Harvey made a detailed study of the dental condition of some thousands of sailors at Sheerness Barracks and in 1985 submitted to the naval medical authorities a memorial entitled Bluejackets Teeth. This called attention to the dreadful dental condition of sailors and the need for qualified dentists in naval hospitals. In response

medical officers were appointed in the 1890s specifically to undertake dental care. Around 1900 they were superseded by civilian dental surgeons both in the naval hospital and naval barracks.

In 1918 some of the civilian dental surgeons working for the Admiralty were offered permanent RNVR commissions. Edward Ernest Fletcher the second officer commemorated was one of these. When the permanent list of RN Dental Officers was formed in 1920 he was selected to head the list and to develop the Naval Dental Service. From small beginnings he guided the growth of the RN Dental Services with great distinction until his retirement in the rank of Surgeon Rear Admiral (D) some 26 years later. Under his care the branch won esteem in the Royal Navy and in the dental professions generally.

To ensure that these two founding fathers of the RNDS are worthily commemorated the Trust Deed requires that awards be made only to a dental officer on the active list has brought about an advance in dental science or the associated sciences in their application to naval service which is worthy of recognition as if he has substantially enhanced the reputation or effectiveness of the RN Dental Services.

APPOINTMENT

As Medical Officer in-Charge Royal Naval Hospital, Plymouth...no July 11 1980

Surgeon Captain J Cox OBE

PROMOTIONS

To Surgeon Lieutenants
S I Squires A Qualie

To Acting Surgeon Lieutenants
M F Hoad

NEW ENTRIES

Surgeon Lieutenant Jonle A Burkett
Acting Surgeon Lieutenant P H Hardy

Surgeon Sub Lieutenants. C B Berry M M Farrish L. J Roberts A W Scott Brown T J W Spalding A P Stoddart C M Wilson

TRANSFERRED TO FULL CAREER COMMISSION

Surgeon Lieutenants (D) D C C Alexander J H Harker M I Lovell M W Weston

TRANSFERRED TO MEDIUM CAREER COMMISSION

Surgeon Lieutenant Commanders E H M B Doyle R A Payne
Surgeon Lieutenants T J R Francis D K Parr D W Somerville

TRANSFERRED TO EIGHT YEAR SHORT CAREER COMMISSION

Surgeon Lieutenant (D) F Cowley

RETIREMENTS

Surgeon Rear Admiral J H Colley OBE QHP, who retired on April 12 1980 joined the Royal Navy in 1949 having qualified at Kings College Hospital the previous year. After an initial spell in the RN Medical School he served in *HMS Consort* and *HMS Cardigan* RNH Plymouth and HM Dockyard Gibraltar. In 1955 he was appointed to *HMS Hermes* to begin his long and distinguished contribution to Aviation Medicine but subsequently he commuted between *HMS Daedalus* and *HMS Ariel* for the next 15 years interrupted by service afloat in *HMS Centaur* Promoted Surgeon Commander in December 1962 and Surgeon Captain in June 1970 he became a Consultant in Aviation Medicine in 1971. The same year he was appointed Command Medical Officer to Flag Officer Naval Air Command in addition to his appointment as President of the Air Medical Board. In 1973 he relinquished his Presidential appointment on becoming Director of Environmental Medicine. In 1975 he became full time Command Medical Officer at *HMS Heron*. In 1978 after a short spell as Director of Health and Research (Naval) he was promoted to Flag Rank and appointed Surgeon Rear Admiral (Ships and Establishments) a post he filled with a gentlemanly enthusiastic dignity.

His contribution to Aviation Medicine both inside and outside the Navy (where amongst other activities he examined for the Diploma in Aviation Medicine) has been outstanding. He groomed a generation of successors to his mantle with rare passing on not only his expertise but a gentle philosophy of how to achieve aim devoid of fuss and rancour.

No-one will forget the hospitality given in his home or in his ship nor his wife a happy tolerant of the ways of his sometimes exuberant friends and aviators. To Joy and Jon we would all wish a very long and happy retirement as you will both be missed.

Surgeon Rear Admiral (D) Brian Rogers QHDS retired on April 2 1980 almost 35 years after joining the Navy. As a student he survived the Liverpool blitz in which most of the centre of that city was obliterated and qualified in December 1945. He immediately joined the RNVR as a Temporary Acting Surgeon Lieutenant (D) and spent 2½ years to the air world before reluctantly going into general practice. At that time the conditions of service were so poor that very few officers could afford to stay to the Permanent Service but he rejoined as soon as things improved.

Brian has a passion for travel which has been indulged by the Navy. His shore service took him to Scotland Malta Dartmouth and Deal and he travelled more widely in *HMS Ocean* and *Eagle*. In one year he spent 256 days at sea he wonders if this is a peace time record.

Promotion to Surgeon Captain (D) came in 1971 while serving at *HMS Raleigh* In 1973 he became Fleet Dental Surgeon and was Commanded Dental Surgeon to CINCNAVHOME in 1977. Brian was originally appointed Director of Naval Dental Services in the rank of Surgeon Commodore (D) but before he assumed office in September 1977 the rank of Surgeon Rear Admiral (D) was restored.

The last three years have been stormy days for the Branch — not of Brian's making for he is a man of peace. His laudable policy as DNDS has been to consolidate and avoid unnecessary change and innovation for its own sake. He selected his

subordinates carefully and delegated whatever was appropriate. He kept a watchful eye and interfered as little as possible with day to day work. The result has been a credit to him and a great relief to a Branch which has been spared the unproductive trauma of over-centralisation.

Brian will not take another job on his retirement. He and Mavis plan to make a six month Grand Tour of Europe with a caravan and then return to Downderry where he can employ his EVT bricks and mortar skills on their home. Brian and Mavis carry with them into retirement the good wishes of their many colleagues and friends.

Surgeon Captain P F Teal whose last appointment was as Director of Health and Research (Naval)

Surgeon Lieutenant Commander G M E Sewell

RELEASED FROM SHORT CAREER COMMISSION

Surgeon Lieutenant Commander J D Torrens
Surgeon Lieutenants G A B Miller G L Newcombe
Surgeon Lieutenant (D) P E Hughes

MEDICAL SERVICE OFFICERS

Queen's Birthday Honours 1980
British Empire Medal
MTI E Nickson

PROMOTION

To Acting Sub-Lieutenant
M Raven

RETIREMENTS
Lieutenant Commander R C Gray
Lieutenant Commander J A Hadley
Lieutenant Commander H W Page

ROYAL NAVAL RESERVE

NEW ENTRY
Surgeon Lieutenant Commander (D) J F Hawkins

RETIREMENT
Surgeon Lieutenant Commander J T Cooke

Surgeon Vice Admiral Sir John Rawlins with Surgeon Rear Admiral J A B Harrison on the occasion of his last official visit as MOG(N) to the Institute of Naval Medicine

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

Queen's Birthday Honours 1980
Associate of the Royal Red Cross
Superintending Sister M M Moore

PROMOTIONS

To Superintending Sister
Miss G M Comrie

To Acting Superintending Sister
Miss M Cross

To Senior Nursing Sister
Miss F M S Robertson

To Senior Clerical and Quarters Officer
Miss S M Brown

To Nursing Sister
Miss P A Hogben

NEW ENTRIES

Senior Nursing Sisters Miss J Bancroft Miss E A Young
Nursing Sisters Misses S I Hutchinson E M Shore P A West

RETIREMENT

Miss Patricia Gould, CBE RRC, QHNS Matron-in-Chief QARNNS, retired on April 21 1980 after 32 years service

Miss Gould joined the QARNNS in 1948 and was appointed to RNH Haslar. Subsequently she served in the naval hospitals at Chatham Hong Kong Malta and Plymouth and in the naval out stations at Stanely and Arbroath. Prior to taking up her appointment as Matron in Chief she served as a Matron at *HMS Ganges* RNH Mtarfa and Haslar and as a Principal Matron at RNH Haslar Plymouth and on the staff of the SRA (Naval Hospitals)

Miss Gould was awarded the ARRC in 1962, the RRC in 1972 and the CBE in 1978. She was admitted to the Grade of Officer Sister in the Venerable Order of St John of Jerusalem in 1973 and to the Grade of Commander Sister in 1977. In May 1976 she was appointed Honorary Nursing Sister to Her Majesty the Queen.

Always a first class nurse she was respected for her high standards of patient care by patients and medical staff alike, who also appreciated her dry sense of humour and sound judgement. Miss Gould always had time to listen and this combined with the rare gift of appearing calm whatever the circumstances, made her a most valued member of QARNNS.

We wish her a long and happy retirement with time at last to enjoy her many interests, amongst which gardening is of present her favourite

ADDENDUM

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Acknowledgements

The author wishes to acknowledge the help and cooperation of the staff of the Environmental Medicine Unit Institute of Naval Medicine Particular thanks are due to Dr I F G Hampton and to the third year physiology students at Leeds University who acted both as subjects and experimenters for this study

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NOTICE

THE EDITOR invites medical and dental staff to send in original papers on professional subjects, travel, personal experiences and other matters. Items of news and matters of interest to the naval medical service will be welcomed from ships and establishments on home and foreign stations. Notices of births, marriages and deaths are inserted free of charge to subscribers.

Articles and communications may be sent at any time to **The Editor, Journal of the Royal Naval Medical Service, Institute of Naval Medicine, Alverstoke, Hants, PO12 2DL**. Two copies should be submitted in typescript. Double spacing should be used throughout. References should be in the Vancouver style (J Roy Nav med Serv 1979 65 179).

The Journal is published three times a year, three numbers comprising one volume.

Subscriptions

The subscription rate will be increased as from January 1, 1981. For RN and RNR medical and dental personnel on the active or retired list and for Consultants to the Royal Navy, the subscription will be £5·00 per annum (post free) payable on January 1 each year.

For all others not in the above categories the subscription will be £7·00 per annum (post free) $15·00 USA & Canada.

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ST. LUKE'S CHURCH, ROYAL NAVAL HOSPITAL, HASLAR

It seems timely to publish this view of the church and quadrangle from the main arcade. With the building of the cross link connection between C and F blocks it will be lost forever

Editorial

Over the past two decades we have concentrated on raising the professional standards of the Royal Naval Medical Service to a level never previously attained. The Waverley Report[1] perhaps first paved the way for this. The Todd Report[2] while never quite fully accepted or implemented by the Government of the time had nevertheless an enormous impact on the professional standards and organisation required of the Medical Branches of the fighting Services. Despite fluctuating policies of successive Governments all three Medical Services can now claim that they are trained and equipped to practise a degree of excellence for their peacetime task.

Can we say the same of our war role? Are we confident that we have the knowledge, the training and the equipment to deal with the mixed casualty situation where conventional injuries occur in a scenario of chemical or possibly biological warfare? How will we cope with triage on a scale never previously known in the nuclear scenario? In a future war all three Services may have to deal with casualties occurring in climatic extremes in either direction. Are we confident that we or more particularly our medical auxiliaries... can provide primary medical care, can carry out such simple procedures as inserting a drip or an airway in sub zero temperatures? Have we mobilised the knowledge and technology that already exists to assist us in these problem areas? Have we at least some tentative knowledge of what to expect at sea?

In General Sir John Hackett's prophetic book 'The Third World War'[3] which he describes as a piece of future history. Vice Admiral Sir Ian McGeoch, a one time Flag Officer Submarines, gives us a glimpse of his predictions of the war at sea in 1985. While this alerts us to need the book is essentially about the land war and provides us with only the gloomiest and most general view of what to expect afloat.

In some of the situations we foresee a considerable fund of knowledge has been developed but few would deny and recent discussion with a wide spectrum of naval medical officers confirms that in general insufficient attention has been paid to our war role since the close of World War Two. The Korean War is now long ago, the lessons of Vietnam are beginning to fade in the minds of our United States allies and perhaps it is timely that reports trickling back from Afghanistan have alerted us to some of our inadequacies. This is our real and most vital role. If we fail to acquire and retain the core of this expertise within the fighting Services so that we can pass on vital knowledge to our Reservists, should the time ever come, it will not be found elsewhere.

Considerable common ground exists between the three Services, the Navy with responsibilities afloat, in the air and for the Royal Marines spans much of this. However there are a number of problems which are peculiarly naval and to this end a dialogue has been held with the US naval authorities over the past twelve months. The

US Navy more than share our concern and indeed consider that their knowledge of combat casualty care is now mainly historical With modern advances in science and technology both Navies have a pressing need to identify those areas where research experience training and equipment require to be updated Clearly with the vast resources available to our friends in the US Navy it makes sense to undertake this as a co operative programme which in turn implies common prediction strategies and common preferred treatment definitions which can be applied to current and projected maritime and Marine Corps operations

Following discussions in Washington London and at the Institute of Naval Medicine the Surgeon General of the US Navy and the Medical Director General (Naval) have concluded that the first and most pressing need is to identify those areas where current knowledge and practice is inadequate to remedy this so far as possible from existing sources of information that are already available within the United States United Kingdom and from combat experience elsewhere globally to translate these results into updated training and equipment and finally to institute research and development programmes to cover the remaining areas in order to ensure that no relevant technological advance has been missed

It has been agreed that the most effective way of implementing this programme is by a series of joint US/UK Naval Medical Workshops Planning for the first of these commenced with the United States Naval Medical Research and Development Command during April 1980 at the Institute of Naval Medicine To be effective it is paramount that the machinery for implementation of the conclusions of these Workshop meetings should be prepared and ready ahead of the meetings themselves considerable thought is now being given to the organisation required

What of the economic climate? Such proposals may make significant financial demands at perhaps the most unfavourable moment in history It will be noted however that the Second Sea Lord in his speech at this year's Greenwich Dinner which is printed in full elsewhere in this Journal recognised the need and promises to do what he can

In conclusion if this might be considered a gloomy message with which to introduce the Winter Journal we may reflect that the ships of the Royal Navy with their well designed Citadel concept their ability for complete shutdown pre-wet and wash present an enormous advantage over the problems faced by the other two fighting Services and indeed over other Navies Given the knowledge training and equipment it is feasible to plan logically and a great deal has already been achieved as even the most casual glance at what Flag Officer Sea Training requires of his inspections clearly demonstrates

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Military Medicine in the United Kingdom. Similarities and Differences with Respect to the United States and other NATO Allies*

J. A. B. Harrison

The existence of Armed Services Medical Services is taken for granted in the United States in the United Kingdom and in other NATO countries It is taken for granted by the Forces themselves though they have varying views of their Medical Services efficiency and importance It is taken for granted by the public and it is taken for granted by the medical profession as a whole in all these countries

Armed Forces Medical Services came into being by what has been euphemistically described as "the pressure of events" and history and disasters of various sorts have helped them to evolve into their present patterns All are now in an active stage of evolution for the 1980s and all are under pressure by the increasing cost of medical services and the scarcity of resources

In the United Kingdom we have acquired a National Health Service and it is cogent to ask if with such a Service separate Armed Services Medical Services are necessary at least in peacetime and I would remind you that in the United Kingdom we have memories of the efficiency of the emergency bed service during the last war and particularly after the D-Day landings This question is clearly fundamental since from it follows the secondary questions of whether we need separate Medical Services for separate Armed Services and their relationship to civilian medical agencies

It is difficult to see how Armed Services could function effectively over any period of time without some medical support particularly if it is accepted that such medical support is environmental physiological psychological and clinical I place clinical support last not because it is least important but because its importance both in the maintenance of standards and in its resuscitative service for casualties is the most obviously recognised and accepted

Quite clearly the military manpower that counts in peace in the Cold War and in any hot war situation is that which is efficient and effective Within overall numbers available the effectives must be maximal and casualties must be resuscitated and restored to effectiveness as quickly as possible For these reasons alone no Armed Service in the Western World could be considered credible without effective medical support at least for protracted operations Indeed for short term operations as well since overall morale is dependent on the resuscitation of the individual casualty In the Western World at least we retain concern for the individual In military terms he has to be considered as expendable to achieve military objectives in an Armed Service But if not killed he must be rescued and resuscitated and this is essential to maintain morale and the essential Go Go Push of an Armed Force whether in attack or defence

In my view it is no criticism of the United Kingdom Health Service that it cannot fulfil

*Extract from the Keynote Address presented at the 86th Annual Meeting of the Association of Military Surgeons of the United States San Diego California on October 4 1979 (Published in full in Military Medicine Vol 145 No 6 June 1980)

this role To begin with its task though massive is static The enormous size of its resources has resulted in an inflexible organisation which is not geared to meet the varying deployments of medical manpower required by the Armed Services in our present peacetime Cold War emergency reaction situation

Need to Separate Medical Support

If then it is accepted as traditionally it has been that the Armed Services need separate medical support how is it to be provided? In the United States and in the United Kingdom it is provided by largely continuous Service uniformed medical officers with integral civilian support These similarities differ only by the size of the Medical Services not in their multifarious tasks In most NATO continuous Service uniformed medical in a reduction in the proportion of long Service uniformed medical officers in their Armed Services' medical support But the general pattern and objective is maintained

In my view although the separate Armed Services have common clinical and particularly specialist clinical problems they have differing care problems in the field in the air and on sea Moreover the environmental physiological and psychological problems differ in these elements and to be more specific in the deployment of land air and sea forces in these elements In France separate Armed Services have a co-ordinated Medical Service and with typical French *élan* the organisation is applied in an effective practical manner which belies its imposing title and complex organisation Because the problems in the field on sea and in the air differ while there are separate Armed Services separated Armed Services Medical Services in their support are desirable In the United States with their (to us) vast numbers and size this is justified whatever various Governmental studies may report in the search for spurious paper economies But in the United Kingdom in the middle in size between the United States and NATO countries it is possible that a common tri-Service Directorate for central personnel and logistic problems may be imposed by our masters the civil political power For me provided each Service has a professional head for its Medical Service this is of secondary importance and sharing and co-ordination of common services particularly of the hospitalised patient may be economic Indeed in the United Kingdom although our Service hospitals are Naval RAF and Army they admit all Service patients and there is considerable cross posting of specialists This seems to me effective economic and actually a sensible use of resources A Naval medical officer posted to an Army hospital makes more sense than a purple officer working in a uniformed hospital run on civilian lines and integrated to no particular Armed Service particularly if those Armed Services remain separate Army Navy and Air Force Services No doubt one day we will all be purple serving purple Servicemen in a purple world

A Naval Medical Service covers a wider field of activity than either the Air Force or the Army Medical Services since most navies fly and all have marines and all are concerned with on sea and under sea activities whether these are conducted in submarines or submersibles in armoured suits or by the free swimming divers

Historical

The Royal Navy is still a traditional Service and it still has strong emotive links with the British people though they are at present disenchanted with Defence Services That is not to say that there is no respect for the Army and the Royal Air Force — indeed there is But we have a long history and long memories and the Andrew has a strong hen on the affections of the

British people provided they do not have to pay too much for it in peacetime

In the United Kingdom the Medical Service of the Navy is the oldest medical service and since its inception it has been an integral part of the Navy it serves and for whose people it cares and whose diseases it attempts to ameliorate At its inception it was entirely ship borne and all treatment both medical and surgical was provided in the sick berths in ships By the end of the 17th century the science of population statistics was developing [2] and an interest in diseases beyond their effect on the individual was becoming apparent led largely by Sir William Petty resident in the traditional Home County of the Navy — Hampshire

By the early part of the 18th century the scientific principles of preventive medicine were being applied in the Navy and in the Army and in the prisons since only there were the sufferers from disease under adequate observation and control and only there were proper statistics of sickness and health available Many of the important developments to preventive medicine were initiated by naval surgeons at this time We need to remember that in the 18th and early 19th century one of the factors in the pre eminence of the British Fleet was its better living conditions They seem harsh and appalling to us but they were vastly better than the conditions of their opponents — less well led less well fed housed and clothed James Lind identified the cause and treatment of scurvy in the first scientific clinical trial carried out at sea in HMS *Salisbury* but incidentally it took Their Lordships of the Admiralty nearly 40 years to accept and officially implement his findings But Lind did more than point the way to the prevention and cure of the great sea scourge He initiated a system for the distillation of fresh water from sea water [3] and made considerable suggestions on hygiene diet and shipborne life [4] From these activities by [illegible] surgeon at sea have developed the present environmental research activities of our Medical Service directed to the improvement of the health and living conditions of the Navy s people

The humanitarian movements of the 18th century had further effects Rising numbers of sick in ships resulted in the need to house and care for sick seamen ashore To effect economy in their maintenance to prevent desertion and to ensure modern methods of treatment Naval Hospitals were established at Portsmouth and Plymouth They are still there and still in use and the reasons for their establishment still exist though desertion of patients is no longer a problem The major defect of these hospitals when established was the low quality of their nursing services and the idleness of their physicians and we seem to have overcome these deficiencies

In the 19th century with advancing medical knowledge an increasing professionalism developed in these hospitals For the first time a dichotomy between expertise ashore and primary medical care in ships where only initial treatment was provided was apparent In 1912 the Naval Medical School was opened at Greenwich but it was not until after the Second World War by which time it had been transferred to Alverstoke that research became a significant addition to its original training task and this led to the establishment of the Institute of Naval Medicine in 1969

The increasing professionalism of the Naval Medical Service has continued into the 20th century Since the Second World War this process has accelerated and particularly in the 1960s a great increase in professional specialist expertise has taken place with Naval Hospitals in the United Kingdom developing equipment and facilities in every way equivalent to a district general hospital (DGH) of the National

Health Service standards to which the Servicemen and his family are entitled This development is reflected by similar improvements not only in the standard of primary medical care in ships and establishments but also in the standards of preventive and occupational medicine

With the technical development of the Navy the Medical Service has become increasingly involved in research occupational medicine and maritime medicine in all its forms submarine underwater aviation and nuclear medicine In a small Service provision of specialist medical officers for both clinical and maritime medical purposes has tended to overshadow the requirement for general duties medical officers for primary care and specialist expertise has become increasingly concentrated in the larger medical establishments though clearly the benefits of this expertise extend throughout the Navy

Present Pattern of the Service

That then is briefly the historical development of the Medical Service of the Navy in the United Kingdom and it sets the pattern for our Service today Today the role of the Medical Service is seen primarily as the conservation of naval manpower by the efficient practice of preventive and therapeutic medicine and to recruit train and deploy medical personnel for this naval task in peace and in war Our naval medical task consists of the following functions

1 Primary medical care in ships and in establishments ashore
2 Clinical specialist medical services in Naval Hospitals for personnel of all three Services and their dependants
3 Deployed specialist services to remote establishments in group deployments at sea to Naval Air Command and to Royal Marine Commando deployments
4 Medical research for the Navy's problems and the provision of specialist needs of submarine underwater aviation and nuclear medicine
5 An occupational health care service in naval bases and dockyards
6 Naval Medical Officer of Health services to naval commands

These tasks are common to all our navies though the size of the commitment clearly varies and the balance between the sub sections differs

In recent years there have been major developments in the organisation style and content of medical practice The major developments in postgraduate medical education requirements in the United Kingdom are having and will continue to have an increasing effect on our problems of fulfilling these tasks of our Service with limited resources Since historically our Service as I hope I have shown has been a leader in these developments it will be sad indeed if we fail to take part in them

In general in the United Kingdom there have been changes and developments in hospital practice Increasing specialisation in medicine has increased the needs for referral for specialist consultant opinion but the current trend is towards a resurgence of general practice organised on a group basis for which modern radiological and pathological investigations are available The rising cost of inpatient treatment and the increase in the number of referrals for consultant opinion have combined to develop outpatient and day bed services for definitive and early treatment Naval Hospitals have developed similarly and an accurate prognosis and duration of disability is clearly of great importance to an Armed Service Medical Service

Current civilian policy is to centre such services in a district general hospital of about 400 beds in order to utilise adequately the essential expensive

diagnostic and operative facilities and the medical expertise Both the United Kingdom Naval Hospitals are well fitted to meet this role

In the United Kingdom the new developments in general practice present problems for the Naval Medical Service because unlike the Army and RAF it has no responsibility for the general practice care of dependants within the United Kingdom Consequently naval medical officers in shore establishments at home tend to have insufficient scope and variety in their work to provide cost effective and at the same time satisfying professional employment It would therefore seem desirable for the Navy to follow the trend in civil life toward group practices by concentrating its primary care in the larger establishments By such means increased job satisfaction for the establishment medical officer will at the same time provide a better service to the Navy The Commanding Officer to Medical Officer relationship could well be strengthened since today personnel management must involve a knowledge of the family situation

Recent Developments

I have referred to the changing trends in medical practice and to the increased requirements of postgraduate medical training And most were foreshadowed by the Royal Commission on Medical Education which examined these problems between 1965 and 1968 Its report [5] known as the Todd Report outlined the requirements for General Professional Training (GPT) and Higher Professional Training (HPT) and there have been progressive developments in the 1970s All doctors must fulfil these training requirements and most require appointment to accredited training posts Most of the training is in Service and though it provides a service to patients the required quality of practice and its variety must mean improved standards To meet these requirements and continue to fulfil our naval medical task with limited personnel resources has and does pose great problems for our Service — problems which I am sure the United States despite the flexibility granted by its increased size must share However unless the Service doctor is to degenerate to a barefoot doctor less effective than his civilian counterpart these training requirements must be met

Indeed doubts as to the professional training and professional satisfaction available to the naval medical officer and poor relative pay led in the early 1970s to a shortfall in medical officer recruitment and resulted in the establishment in 1971 of the Defence Medical Services Enquiry Committee which reported[6] in 1973 after extensive enquiries and consultations and visits to Service hospitals and establishments

The Committee examined the question of whether Defence Medical Services were necessary It concluded that the needs of the individual Armed Forces could best be served by separate Medical Services and that the performance of all three Defence Medical Services during their period of examination was satisfactory Each Medical Service had attractions to offer but also had handicaps to overcome For the future each Medical Service would be looking for recruits in a market that would be more competitive than it was in 1973 If each Medical Service was to be successful in attracting its share of able people each Service would have to respond positively to the changes that were taking place in the shape of the NHS and the projected changes in medical training both for doctors and for the professions supplementary to medicine In order to recruit and retain able personnel it would be necessary for the Defence Medical Services to offer training clinical experience and professional job satisfaction which could stand comparison

with those provided by the National Health Service

The Committee examined the urgent need to secure economy in the Medical Services of the Armed Forces It also recognised that if the Armed Forces were to recruit the numbers they would require the provision of the new forms of General Professional Training and Higher Professional Training was essential The Committee did not consider that these requirements were in conflict but that economies should be made in the running and administration of each of the Armed Forces Medical Services However they did not recommend as one of these economies that amalgamation of the Armed Forces Medical Services would effect either an increased efficiency or an overall economy

What then is the Service to which we hope to attract more recruits to fulfil the role I have described for the Navy? Though small the Naval Medical Service is complex since the naval medical task itself has become complex and specialised and particularly in its requirements for research into human factors ergonomics and physiological function in the specialised environments of modern naval operations in the fields of aviation submarine underwater and nuclear medicine and the developing requirements of occupational medicine in general

Your Surgeon-General in the US Navy has described the 1970s as the decade of occupational medicine in the United States and we share this view in the United Kingdom In our country the establishment of the Faculty of Occupational Medicine will introduce the requirements of accredited training to which I have already referred since this is an important area of medicine for all our navies in the future

In the Royal Navy medical officers serve in ships and unlike the United States in our nuclear submarines both SSNs and SSBNs They serve with the Royal Marine Commandos and in Royal Marine establishments and in naval establishments In all these situations they provide primary medical care and occupational health care In addition medical officers are trained and give a specialised service in the maritime specialties I have described and in Naval Hospitals in all the specialised clinical disciplines We differ at present from the United States in that our Medical Branch ratings though trained as either medical technicians or medical assistants to support medical officers in these roles do not as yet progress to the full paramedic responsibilities of your independent hospital corpsmen and physician's assistants We are examining your training programmes and may propose referring some of our ratings for your training before introducing a similar grade in the Royal Navy

Similarly our Medical Services officers do not yet fulfil a parascientific role as completely as do yours though we have made a start with Medical Services officers trained in ergonomics and in the basic techniques required for our increasing interests in the problems of survival medicine

Our Common Problem

In describing our Service I do not wish to imply it is unique It constantly surprises me that we fulfil all these tasks with about 500 officers and 1 000 ratings with civilian support It will be apparent to you that we have similar tasks and we share particular specialist interests Your greater size probably creates greater organisational problems and the smaller size of many NATO Naval Medical Services means that they cannot give a total support service in all fields of maritime medicine

But in all our countries we clearly face common problems of recruitment and retention of well motivated well trained personnel with expertise in the fields required by the Navy To recruit we have to offer good training and good professional

job satisfaction To retain we have to motivate such personnel to the tradition of care and service to the sea people we serve And of course similar problems apply to the Air Force and to the Army Medical Services

As this is a personal view of our problems in fulfilling our roles and of recruiting and training the personnel to do it I can say that I see no easy solution In all our Services we clearly need equivalence in pay with civilian doctors in our respective countries But if our Services are to be effective we need more We need to motivate our recruits to the Navy and this can in my view only be achieved by early sea service Thereafter we need good professional training and good professional job satisfaction in meeting the Navy's task If we achieve these objectives in the United Kingdom I see in the 1980s a return to the climate of the 1960s and hopefully the uncertainties and doubts of the 1970s will fade

The long history of our Naval Medical Service has been directed to care for our sea people by increasing the professionalism of all our medical personnel Only by adhering to these objectives can we hope to fulfil our task and retain the proper personnel we require for that task

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The Prevention and Treatment of Alcoholism in the Royal Navy — 1. A Policy

F M J Hiles

This paper concerns current and proposed measures for the prevention and treatment of alcoholism in the Royal Navy and discusses some of the factors which have been considered in relation to these measures.

In the formulation of current Naval policy towards alcohol abuse three major questions were considered:

1. Is there a problem of significant magnitude within the Royal Navy?
2. In what way do the special features of naval life affect the nature of the problem?
3. How should the problem be minimised?

Firstly it must be stated that the prevalence of alcoholism within the Royal Navy has not been established. We have reliable statistics on those individuals identified[1] as having a significant alcohol problem but these reflect the ability of naval management and medical agencies to identify problem drinkers rather than the true prevalence. When one considers the grave long term consequences of problem drinking however it is clear even from these conservative estimates of prevalence that formal programmes for prevention and treatment are required.

Although it can be argued that there may be factors pertaining to a Service environment and to recruits to the Service which might predispose to alcohol abuse concern about the prevalence of alcohol related problems within the Royal Navy relative to that in the civilian population has not been a primary factor in naval policy. Motivation for action has been fuelled by the widely publicised evidence regarding increasing alcohol consumption and associated problems in the nation as a whole. Of special concern is the fact that the population sub group from which naval recruits are drawn (young people) shows particularly alarming trends[2] there being no sound reasons for believing that the Service population is excluded from these trends.

Measures for the collection of statistics have recently been instituted to enable continual assessment of the magnitude of the problem in the Royal Navy but having accepted that a significant problem exists remedial action need not be delayed by further investigation of the extent of that problem.

The second question is concerned with the manner in which the special features of naval life affect the nature of the Royal Navy's alcohol problem. Alcohol has traditionally played a part in naval life and despite considerable efforts by naval management to encourage other activities which do not involve large quantities of alcohol the run ashore remains a traditional way for our young (and not so young) men to relax when off duty. The use of alcohol in celebration and as an aid to relaxation is given tacit approval in many of the Navy's formal institutions (eg the official cocktail party "splicing the mainbrace" and the alcohol privilege at sea). These institutions are not of course intended to encourage excessive drinking but can be interpreted as official approval of moderate drinking as an acceptable activity within the naval

environment

Royal Naval policy on the consumption of alcohol reached a turning point with the abolition of the tot in 1970. Until that time every man over the age of 20 was entitled to draw a daily rum ration. Although the amount of alcohol involved was relatively small, tot time was eagerly anticipated occasion which introduced many to regular daily drinking. With the end of the rum issue came a new attitude which respected the freedom of the individual to enjoy alcohol but relied on him to use the privilege in a responsible manner. Queen's Regulations for the Royal Navy gives guidance to commanding officers on the control of drinking on board. Her Majesty's ships. In general junior ratings may buy up to three 12 ounce cans of beer per day and senior ratings up to three or four pints of beer and two or three measures of spirits. There are no set allowances for officers, but consumption is recorded and monitored by the commanding officer. In practice actual consumption levels vary according to operational conditions and are in many instances far less than the maxima permitted. These controls are probably superfluous for the majority of the naval population who are generally moderate drinkers, but underline the expectation of the Service that individuals will not abuse the alcohol privilege. Such controls are of limited value, however, in preventing those who are developing a special relationship with alcohol from indulging their habit and do not extend to shore-side drinking. The presence of alcohol in the working environment permits some measure of control and encourages community spirit but may, of course, facilitate excessive drinking in the minority.

Drunkenness is a punishable offence but its assessment is a matter for the subjective evaluation of the duty officer and may therefore not reflect with any accuracy the alcohol consumption of the tolerant individual.

Standards of dress and behaviour in the civilian community have altered considerably during the last few decades and our young Servicemen are therefore increasingly aware of the degree to which they are expected to conform to the traditional naval standards over which their civilian counterparts appear to have relative freedom. Over indulgence in what might appear to be a traditionally approved form of behaviour — drinking — may thus occur as a compensatory mechanism.

The Royal Navy consists of a number of small close knit communities wherein peer group pressures are strong. Established patterns of behaviour are readily accepted by newcomers especially when they appear to have some ritual significance in terms of advancement, virility or maturity. The dominant individuals within a social sub-group can set the tone for the behaviour of that group overtly or covertly encouraging subordinate members to follow their lead thus when a group becomes dominated by excessive drinkers it is likely that the general level of alcohol consumption within that group will increase. This hypothesis that there is a contagious element to alcohol consumption within small groups may be extended to suggest that the drinking style of such groups may be significantly altered by weeding or seeding processes. The maintenance of standards of health efficiency and conduct by selection for recruitment and promotion is a familiar example of the operation of such processes.

Age is a major factor in the naval community's attitude to problem drinking. The majority of naval personnel return to civilian life before the age of 40 and therefore gross manifestations of damage may not become apparent during the Service career of the alcohol abuser. The naval community, therefore, may fail to see the long term consequences of regular excessive drinking and thus undervalue the risks involved.

Preservation of optimum performance amongst naval personnel has become in

creasingly critical with the requirement to operate and maintain technologically advanced systems It is now fully recognised that the drinking habits of our seafaring forebears (the "Jolly Jack Tar" stereotype) have no place in the modern Navy Service men are expected to behave in a responsible manner but have the money and the opportunity to drink excessively and may not fully comprehend the effect of alcohol on performance or the duration of those effects The response to the small scale education programme which has been conducted over recent years reflects a general lack of knowledge regarding the effects of alcohol at low blood levels and of the acute and chronic hazards of alcohol abuse Individuals may thus have been ill equipped to respond to the call for sensible drinking which has been the hallmark of past naval alcohol policy

The structure of the Service is such however that we have the opportunity to observe and control the behaviour of employees to a much greater degree than would be possible in a civilian organisation Thus we have the potential to detect early signs of alcoholism and to effect an early intervention from which there is clearly much to be gained A prerequisite for such early intervention is of course, adequate training of management at all levels

The third question concerns the measures required to minimise the Navy's alcohol problem

The traditional concept of alcoholism as a condition manifest by its consequences is inappropriate in a setting where a high level of preventive medicine can be practised We recognise the various social physical and psychological consequences of the behaviour of excessive drinking over a long period of time but we should also recognise that it is this behaviour (excessive drinking) which constitutes the alcoholic condition and not the tangible consequences which depend so much on external factors such as financial status sub cultural norms individual constitution and chance occurrences

In the Service setting we have a choice we may confine ourselves to the recognition of alcoholism only when there is unequivocal evidence of alcohol related damage *or* we may take pains to recognise the condition at the earliest possible stage when the predominant symptom is the behaviour of excessive drinking and when overt damage is minimal Our choice in these issues has profound implications in terms of our approach to the problem If we take the first option we can happily continue a low key non interventive approach geared to the management of damaged alcoholics There are inherent attractions in this choice not least of which is that the patients will be more easily confronted with the deviance of their behaviour and will be more likely to recognise a need for change. The treatment regime could thus remain appropriate for patients of relatively high initial motivation from whom we might expect a relatively high degree of acceptance of therapeutic goals By careful selection of those patients with an apparently good prognosis we might also appear to achieve a high recovery rate If on the other hand we opt for early intervention in order to help individuals their families and colleagues avoid the penalties of the alcoholic lifestyle our approach must be radically different Firstly we must be able to identify the problem drinker at an early stage secondly we must be able to encourage him/her to accept the need for change and thirdly we must be able to offer treatment appropriate to the needs of this group of patients

Anyone who has witnessed the tragic long term consequences of the excessive drinking lifestyle cannot fail to observe the merits of early intervention from the point of view both of the Service and of the individual We must therefore take this second more difficult option the aims of which can only be met by a carefully integrated programme of

preventive education and treatment The rates at which different elements of this programme develop are critical It is vital at all times that we can successfully treat the majority of those problem drinkers identified by naval management

The Royal Navy's current alcohol programme has three elements

1 Preventive education
2 Early identification of problem drinkers
3 The institution of appropriate counselling treatment or administrative action

The principles behind this programme have been approved at the highest levels of naval management The programme which will now be described is however in its infancy and contains elements which exist at present only in a theoretical phase

Preventive Education

The proposed programme of preventive education aims to reduce inefficiency and morbidity due to alcohol by encouraging a responsible use of alcohol by the individual and promoting a responsible attitude towards excessive drinking within the various peer groups. Efforts in this direction have not in the past been sufficiently well co-ordinated nor uniform in content to achieve optimum effect It is now proposed to institute a centrally co ordinated multi media campaign using posters audi visual aids and lecture teams

The material content of this campign has not yet been finalised but it is likely that the emphasis will be on the effects of alcohol on work performance, popular misconceptions regarding alcohol short and long term hazards and the normal place of alcohol in society We should endeavour to avoid the paternalistic or authoritarian approach which might negatively influence the outcome of this part of the programme

Early identification of problem drinkers

The objectives in this element are the early identification and satisfactory management of problem drinkers as a necessary precursor to counselling and treatment The target group comprise management (particularly at lower levels), medical staff chaplains and welfare and social workers This group are required to implement naval alcohol policy and therefore require instruction in the warning signs of incipient and established alcoholism and the methods by which appropriate help can be instituted Some of the group will also require training in confrontation and counselling techniques appropriate in alcoholism and in the special needs of the recovering alcoholic and his/her family

The institution of appropriate counselling and treatment or administrative action

Identified problem drinkers are the target group here They require special education to promote insight and motivation for recovery whether the goal be total abstention or controlled drinking Treatment for alcoholism has been available within the Service for many years, but a treatment unit devoted primarily to naval alcoholics has only been in existence since 1978 Since then more than 500 problem drinkers have attended formal education classes to which they had been referred following initial psychiatric assessment At these classes long and short term physical hazards and the social and psychological complications of alcohol abuse are explained in lay terms, the nature of alcohol dependence is described and the principles of recovery discussed Patients are also introduced to the principles of group therapy through structured experiences (formal activities which provide practical experience of the mechanics of human relationships — eg the building of trust the essentials of communication the management of conflict) Owing to the policy of early intervention some patients have to be coerced into education and initially attend somewhat reluctantly but through a dispassionate and non authoritarian presentation of the course

material these young men are encouraged to examine their drinking lifestyles and to recognise a need for change

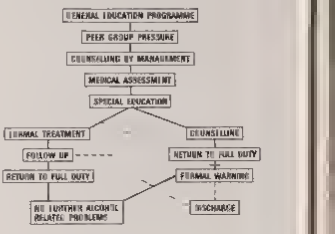
Following the education course, individuals are counselled regarding the nature of their specific alcohol problem and advised on appropriate remedial measures Where there are clear signs of incipient or established alcoholism a period of formal treatment is recommended

Treatment is based on closed group therapy structured experiences and introduction to Alcoholics Anonymous The Alcohol Clinic at the Royal Naval Hospital Haslar operates as a day clinic patients being hospitalised only for detoxification or for medical investigations. Patients are required to accept an initial goal of total abstention although we recognise controlled drinking as a satisfactory long term outcome for some younger less dependent patients Where there has been only a history of alcohol abuse without associated features of dependence the individual is counselled regarding moderate drinking and warned of the possibility of discharge from the Service if he/she fails to heed that advice A similar warning is given to those alcoholics who either refuse treatment or fail to achieve therapeutic goals Discharge of refractory problem drinkers is a logical step if one accepts the contagious nature of the excessive drinking habit referred to earlier

Patients are followed up for at least one year after formal treatment, during the first six months of which they remain shore based We are attempting to maintain long term contact with our successfully recovering alcoholics in order to establish a network of peripheral support for future patients returning to duty

The data collected from patients is expected to help establish a profile of naval alcoholism which may allow us to outline some risk factors and to make appropriate modifications to the alcohol programme in the future

To illustrate the projected operation of the Royal Navy's alcohol programme let us follow a hypothetical example of an individual passing through its various levels (fig 1)



On joining the Royal Navy he will be exposed to the general education programme which If he drinks encourages him to do so in a sensible and responsible manner Should he fail to respond at this stage his excessive drinking will be observed by his peer group who have been exhorted to exert pressure upon deviant group members Lack of response to peer group pressure will result in counselling at lower management levels thus giving him a final opportunity to modify his drinking before formal administrative action is instituted If alcohol abuse then continues he will be referred for medical assessment followed by special alcohol education Should assessment reveal no evidence of alcohol dependence, he will be given clear advice regarding moderate drinking and returned to duty where he will be warned by his commanding officer of the possibility of discharge from the Service if alcohol abuse continues If a diagnosis of alcoholism is made he will be offered treatment after which he returns to duty having achieved therapeutic goals Should he refuse treatment or reject therapeutic goals however he may be discharged from the Service

Successful operation of this alcohol programme is expected not only to reduce alcohol related morbidity within the Royal Navy but also to improve the quality of life of many of our young Servicemen

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Adult Respiratory Distress Syndrome — A Pathological View

B. J. Addis

ABSTRACT

Progressive respiratory insufficiency may be a complication of shock trauma or sepsis. The pathology of this syndrome is reviewed with particular emphasis on the mechanisms by which the various factors involved cause diffuse alveolar damage. Other related factors particularly oxygen toxicity are discussed and the contributions that they make both to the clinical syndrome and to the morphological changes in the lungs are assessed.

Introduction

The term Adult Respiratory Distress Syndrome (ARDS) is widely used to describe severe and progressive respiratory insufficiency developing in patients with no previous history of lung disease in response to a variety of insults [1]. Regardless of the nature of the insult the histological appearances of the lungs are similar and in the early stages when hyaline membranes may be present resemble those seen in neonates with respiratory distress syndrome.

The importance of respiratory failure as a complication of shock and trauma was first appreciated during the Vietnam war—despite prompt and adequate treatment and fluid replacement injured patients often developed severe respiratory insufficiency characteristically after an interval of 48–72 hours [2].

Various terms describe the circumstances under which ARDS may develop. Apart from major injury and associated factors—such as severe haemorrhage burns massive blood transfusion and shock ("post-traumatic pulmonary insufficiency" "traumatic wet lung" "shock lung") these include sepsis ("septic lung") mechanical ventilation ("respirator lung") head injury ("neurogenic pulmonary oedema") and surgical procedures associated with cardio-pulmonary by-pass ("post perfusion pulmonary insufficiency").

Factors capable of producing ARDS damage the lung at the level of the alveolus. Such damage initiates a sequence of changes which can be assessed by lung biopsy or at autopsy. Knowledge of the early lesions and of the mechanisms of injury is based largely on experimental work in animals and in particular on the use of electron microscopy.

Structure of the Alveolus

The alveoli are lined by epithelial cells of two types. Type 1 cells (membranous pneumocytes) have very attenuated cytoplasm with relatively few organelles and cover about 95 per cent of the alveolar surface. Because of their highly specialised shape they are extremely susceptible to injury and appear to be incapable of cell division. Type 2 cells (granular pneumocytes) are equally numerous but roughly cuboidal and therefore cover only the remaining 5 per cent of the surface. The lamellar cytoplasmic inclusions of the type 2 cells represent the sites of synthesis of surfactant the surface active phospholipid responsible for the maintenance of alveolar stability. Damage to type 1 cells leads to proliferation of the less sensitive type 2 cells to cover the denuded basement membrane. Once the stimulus to hyperplasia is removed type 2 cells are able progressively to transform into type 1 cells [3].

Alveolar epithelium is separated from the endothelial lining of the pulmonary capillaries by a composite epithelial and endothelial basement membrane This arrangement provides a thin air blood barrier for gas exchange (fig 1) The pulmonary endothelial cell has a thin sheet of cytoplasm similar to the type I cell and is equally susceptible to damage It has important metabolic functions which include activation of angiotensin and inactivation of circulating agents such as bradykinin and serotonin [4] Whereas pulmonary endothelial cell junctions are discontinuous and separated by intercellular gaps 4nm wide pulmonary epithelial cells are connected by tight junctions with fusion of the outer leaflets of the cell membranes of adjacent cells

Fig 1 Diagram of normal alveolar wall showing the membrane AE Type I epithelial cell BM basement membrane WBC white blood cell in capillary lumen (x 25 000) (E Kissel permission of M J M Cressey CDE Portman Dental)

The small amount of interstitial tissue surrounding pulmonary capillaries contains collagen fibres and a few fibroblasts This is continuous between adjacent alveoli and with the interstitial tissue around terminal bronchioles

Mechanisms of Pulmonary Oedema[2]

Under normal circumstances endothelial junctions are permeable to water and small molecules and in the lung as in other tissues the net flow of water from capillary to interstitial space depends on the balance between hydrostatic and osmotic pressures Leakage of larger molecules is partially dependant on hydrostatic pressure and this has been interpreted as evidence for stretching of interendothelial gaps Alveolar epithelium forms a more efficient barrier being relatively impermeable to water and small tracer molecules

Pulmonary oedema occurs either when the balance between hydrostatic and osmotic pressures is altered as in cardiogenic pulmonary oedema or when the permeability of the vessel wall is increased In the latter situation damage to endothelial and epithelial cells permits leakage of fluid and large molecules including proteins into the interstitium at normal hydrostatic pressure The problem can then be exacerbated by fluid overloading when increased permeability leads to the rapid development of pulmonary oedema

Morphological Changes in ARDS

The structural details of the alveolar wall are beyond the limit of resolution of the light microscope and damage to epithelium or endothelium can only be detected at an early stage ultrastructurally The first changes detectable by light microscopy are vascular congestion and oedema Pulmonary capillaries are congested and haemorrhage may occur into alveoli Oedema may be predominantly interstitial most easily detectable in the loose connective tissue around small vessels or may be intra alveolar when alveoli are filled with eosinophilic fluid

The lungs at this stage are heavy often weighing over 1000g each with a purple pleural surface and a haemorrhagic cut surface from which pink oedema fluid exudes Patchy alveolar collapse is often

present and this combination of collapse and vascular congestion is sometimes known as congestive atelectasis

These are the appearances most often seen in patients dying during an episode of shock and they correspond with those described by Moon in his classical account of the pathology of shock [5] Less commonly the lungs may have the drier more solid liver-like cut surface associated with the presence of hyaline membranes These are intensely eosinophilic structures which are closely applied to the walls of respiratory bronchioles and alveolar ducts and first appear at the tips of inter-alveolar septa (fig 2) They contain cell debris from necrotic alveolar epithelium and plasma protein predominantly albumin and globulins In contrast to the fibrin rich acute inflammatory exudate that fills the alveoli in pneumonia fibrin is difficult to demonstrate in hyaline membranes

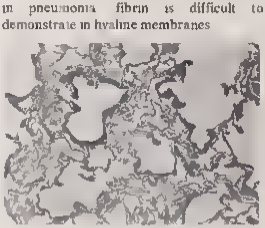

Fig 2 *Hyaline membranes line respiratory bronchioles and alveolar ducts and an interstitial inflammatory infiltrate is present (M S B x 63)*

Electron microscopy at this stage reveals membranes of inspissated protein and cell debris closely applied to the epithelial side of the basement membrane and swelling or necrosis of endothelial cells The interstitial space is expanded by oedema fluid with separation of the two components of the basement membrane

After 48 to 72 hours there is increased cellularity of the interstitium due to an accumulation of histiocytes plasma cells and mast cells [7] Fibroblast proliferation is accompanied by collagen deposition and type 2 cells proliferate to cover the basement membrane and replace damaged type 1 cells (fig 3) The thickness of the air blood barrier is thus considerably increased

Fig 3 *Interstitial oedema is present and the epithelial cells proliferate to cover the denuded surface Some retain their cuboidal shape but others are more flattened (Masson Trichrome Toluidine Blue x 1000)*

At this stage surfactant activity may be altered due to changes in the rate of production and inactivation by protein containing oedema fluid However there is no real evidence that primary surfactant deficiency is a factor in ARDS [8]

Progressive fibrosis occurs by continued deposition of collagen by interstitial fibroblasts (fig 4) and may be extensive after about eight days [9] Infection commonly

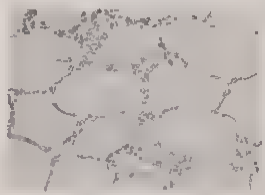

Fig 4 *Early interstitial fibrosis Thickened alveolar walls due to interstitial deposition of collagen with an interstitial infiltrate of inflammatory cells (H and E x 160)*

supervenes with additional fibrosis due to organisation of intra alveolar fibrinous exudate Organising exudate is covered by regenerating type 2 cells and incorporated into the interstitium [10] As fibrosis proceeds alveoli are obliterated and distorted some bronchioles dilate and the final picture of end stage honeycomb lung can evolve in as short a time as three to four weeks (fig 5)

Fig 5 *Advanced pulmonary fibrosis following fat embolism and oxygen therapy Residual air spaces are lined by proliferating cuboidal type 2 epithelial cells (M S H x 63)*

Factors contributing to Lung Damage

The type of lung damage described above called diffuse alveolar damage by Liebow and his associates [9 11] can be produced by a variety of agents Although the time sequence may be different, the changes also resemble those seen in idiopathic pulmonary fibrosis or interstitial pneumonia of the usual type (UIP) [12] Diffuse alveolar damage occurs in pneumonia due to influenza virus some acute bacterial pneumonias notably acute streptococcal pneumonia pneumonic plague and acute tuberculous pneumonia mycoplasmal pneumonia and Legionnaire's disease Gases capable of causing diffuse alveolar damage include mercury vapour cadmium oxide fumes phosgene and the oxidant gases ozone sulphur dioxide and nitrogen dioxide Similar damage is caused by ingestion of the herbicide paraquat [11] irradiation of the lung and as a complication of therapy with some cytotoxic drugs such as bleomycin busulphan and BCNU Experimental models have been produced by exposing guinea pigs to 15% carbon dioxide[14] or by injecting animals with N nitroso N methyl urethane[15] or alphanaphthylthiourea [5]

When these agents produce pulmonary damage they usually act alone and the cause is apparent It might be preferable to restrict use of the term adult respiratory distress syndrome to those cases where the aetiology is less certain For example a patient with severe multiple injuries may suffer an episode of hypovolaemic shock aspiration of gastric contents transfusion of large volumes of stored blood fat embolism and prolonged oxygen therapy at high concentrations To determine which of these factors is responsible firstly for the initial respiratory insufficiency and secondly for the morphological changes in the lungs at autopsy may be very difficult

Oxygen Toxicity

Oxygen like the other oxidant gases acts by producing an excess of free radicles capable of damaging cell membranes and oxidoreductive enzymes The pulmonary effects of oxygen are of obvious importance not only in hospital practice but also to those involved with diving or aerospace medicine Although much experimental work has been carried out in animals the information obtained is not directly applicable to man because of marked variations in susceptibility between species [16] It is also uncertain whether the phenomenon of adaptive tolerance shown by some species [17 18] occurs in man

The earliest ultrastructural change in oxygen toxicity is swelling of endothelial cells, some having grossly swollen and clear cytoplasm [18] This is followed by swelling and fragmentation of type 1 cells These become separated from the basement membrane which is then coated by thin strands of protein In monkeys exposed to

100% oxygen at atmospheric pressure the normal alveolar lining is completely replaced by proliferating type 2 cells after 12 days The lung then returns to practically normal after recovery in room air [18]

In man the morphological changes brought about by prolonged administration of oxygen at high concentration can only be assessed in autopsy material- when oxygen may be only one of several factors resulting in lung damage In non fatal cases damage can only be inferred from functional and radiological changes

Kapanci and his colleagues have shown that severe changes occur in the lungs when patients are given 60-100% oxygen for periods longer than three days [18] Sevitt concluded that an inspired oxygen concentration of 40% at atmospheric pressure can produce lung damage provided that the period of exposure is sufficiently long Sub clinical focal changes may occur with less prolonged exposure or exposure to lesser concentrations [19]

Pratt considers that alveolar duct fibrosis (fig 6) is characteristic of oxygen toxicity and that the pulmonary lesions seen in ARDS are produced in the main by the toxic effects of oxygen rather than the underlying disease process [20]

It is now generally agreed that mechanical ventilation as such does not contribute to lung damage [21] Nevertheless Tephtz considers that hyaline membranes may form as a result of ventilating patients with pulmonary oedema Restoration of air flow through distal airways filled with oedema fluid may cause drying and inspissation of proteins [5]

Fig 6 *Alveolar duct fibrosis associated with oxygen toxicity Loose connective tissue fills an alveolar duct (centre) Surrounding alveoli contain oedema fluid and macrophages (H and E x 63)*

Fat Embolism

Patients with fractures almost invariably have pulmonary fat emboli Small numbers are unlikely to produce symptoms but major fat embolism is associated with progressive hypoxaemia confusion and petechial haemorrhages Sevitt argues that pulmonary fat embolism leads to arteriolar constriction in the lungs and shunting via pulmonary bronchial anastomoses Alveolar capillaries are by passed systemic embolism occurs and hypoxaemia develops He attributes the histological changes in the lungs of patients dying after major fat embolism to the effects of prolonged ventilation with high concentrations of oxygen [22]

An alternative view is that the histological changes result from a chemical vasculitis related to the toxicity of free fatty acids released by the action of pulmonary lipase on neutral fats [23] In experimental animals intravenous injection of oleic acid produces necrosis of endothelial and type 1 cells followed by proliferation of type 2 cells and progressive fibrosis [24]

Pulmonary Aspiration

Pulmonary aspiration of gastric contents is frequent in unconscious or semiconscious patients The pH of the aspirated fluid is the most important factor determining the degree of pulmonary oedema and pneumonitis [25] Ultrastructural studies have shown damage to both epithelial and endothelial cells and separation from the basement membrane When the fluid is strongly acid the changes are most severe and include necrosis and neutrophil exudation but even distilled water or saline

are able to cause lesser degrees of damage Disturbance of the osmotic gradient across the alveolar capillary membrane may therefore be a factor [26]

Neurogenic Pulmonary Oedema

Neurogenic pulmonary oedema may develop almost instantaneously after injury to the central nervous system and is particularly associated with hypothalamic lesions Theodore and Robin have proposed that damage to pulmonary capillaries with ensuing haemorrhage and leakage of oedema fluid high in protein content follows a massive alpha adrenergic discharge and increased pressure in the pulmonary capillary bed [27]

Shock and Sepsis

The later related roles of shock and sepsis in the production of lung lesions are controversial Patients dying during an episode of shock may have pulmonary oedema but it is unusual to see hyaline membranes At a later stage often after prolonged mechanical ventilation and the onset of sepsis it is no longer possible to be certain of the relative importance of various factors

Shock is associated with profound haemodynamic changes In the lungs of animals with haemorrhagic shock sequential observations and cine microscopy have shown a distinct slowing of blood flow with congestion and sludging in the capillary bed [28 29] The circulatory changes are accompanied by aggregation of platelets and white cells to form thrombo emboli in the microcirculation [30 31 32 33] Subsequent platelet disintegration releases ADP serotonin prostaglandins and histamine but the contribution each of these substances makes to the pulmonary haemodynamic changes is uncertain [31]

Hypotension or severe hypovolaemia without hypotension leads to leucocyte aggregation and disintegration with release of lysosomes [32] Lysosomal enzymes may therefore damage endothelium and alveolar epithelium resulting in increased permeability Complement activation and generation of C5a is one cause of granulocyte activation and complement stimulated granulocytes are able to damage endothelial cells in culture It may therefore be possible to predict the onset of ARDS by monitoring plasma levels of C5a [34]

Platelet and white cell aggregates also develop in stored blood and these also have been implicated in ARDS Although there is a rough correlation between the numbers of pulmonary micro emboli assessed in lung sections clinical evidence for the role of transfusion in ARDS is contradictory Some consider that ARDS is directly related to the number of microaggregates transfused whereas one well documented series failed to demonstrate such a relationship [35] Similarly it has not been possible to produce progressive respiratory insufficiency in animals by massive transfusion of stored blood [35]

Formation of platelet and white cell aggregates appears to be independent of disseminated intravascular coagulation (DIC) Nevertheless the theory that DIC plays a central role in the production of ARDS is an attractive one [30 36] Some patients with ARDS do have haematological evidence of DIC but in the series reported by Douglas *et al* a fall in platelet concentration and a rise in the level of fibrin degradation products occurred after the onset of respiratory failure [17]

Fibrinolysis occurs simultaneously with DIC the principal degradation product being a complex of fibrin monomer with fragment D Infusion of fragment D complexes has been shown to induce pulmonary oedema possibly mediated via platelet aggregation [36]

In assessing the role of sepsis in ARDS it is important to distinguish between

pneumonia and infection elsewhere Pneumonia may be the primary disease producing hypoxaemia that requires mechanical ventilation or may be a complication of mechanical ventilation when the infecting organisms are often enteric gram negative bacilli such as *Pseudomonas* or *Klebsiella sp* [39]

From their careful analysis of a large series of patients Fulton and Rayner conclude that properly treated shock does not cause ARDS although some patients may require ventilatory support because of pulmonary oedema They believe that ARDS is due to pneumonia caused by gram negative organisms often secondary to infection elsewhere and that the histological picture is essentially that of bacterial pneumonia [39]

Other workers have stressed the importance of the remote effect on the lungs of infection elsewhere in the body[31] and a great deal of attention has been paid to endotoxin This is a lipopolysaccharide component of the cell walls of gram negative bacteria released when bacteria die and disintegrate Its many effects include activation of the coagulation mechanism and activation of complement [40] An elegant series of experiments using perfused animal lungs *in situ* demonstrated that endotoxin is capable of producing a rise in pulmonary perfusion pressure and histological lung changes and that these effects depend on an intact coagulation mechanism [31] A link between endotoxin DIC and ARDS seems lo be emerging More recently however Clowes and his associates have shown that no correlation exists between the presence of circulating endotoxin and the severity of the pulmonary dysfunction A much closer correlation was found with the presence of low molecular weight non protein substances detectable by bioassay using a lung preparation [41]

The same workers have also confirmed the importance of circulating kinins Kinins are vasoactive peptides released from circulating precursors by a mechanism which commences like that of the coagulation sequence with activation of factor XII Infusion of bradykinin is known to alter pulmonary vascular resistance and to produce histological changes in the lungs In patients with gram negative sepsis blood kinin levels including bradykinin are elevated [42]

Personal Observations

A series of cases showing the lung changes described have been collected from RNH Haslar RNH Malta and hospitals within the Portsmouth group (Table 1) If the criteria given above are accepted [38 10] all but one of the patients had received oxygen in sufficient concentration and for a sufficiently long period to account for most of the histological changes at autopsy These observations agree with those of Pratt[6] and of Orell who compared cases in which oxygen therapy was associated with ARDS and cases in which oxygen therapy was required for other reasons The histological changes were similar in the two groups although more severe in the first [43]

Although prolonged therapy with potentially toxic concentrations of oxygen may be unavoidable in patients with severe hypoxaemia therapy is not of course commenced until respiratory insufficiency is established Opportunities to examine the lungs at this stage before oxygen toxicity is

TABLE

Case	Age	Sex	Clinical details	Ventilated	Oxygen
1	47	M	Haemorrhagic pancreatitis Laparotomy and drainage of pancreatic abscess	3 days	70–80%
2	3	F	Burns scalds over face neck and upper limbs	3 days	70–80%
3	29	M	Meningitis Acute pneumonia over	13 days	40–50%
4	49	M	Lung cancer Surgery for pleural empyema	1 day	30–40%
5	49	M	Lung cancer surgery Pleural empyema	4 days	60–70%
6	9	F	Head injuries Fractured skull subdural haematoma	36 days	30–50%

superimposed are infrequent. This was possible in one of our cases (case 1) and the findings underline the importance of sepsis as a potent cause of alveolar damage. Generalised peritonitis was due to perforation of a colonic diverticulum in a patient who had received long-term steroid therapy for rheumatoid disease. Histological evidence of DIC with microemboli in the lungs and kidneys was associated with hyaline membrane formation. In this case a combination of gram-negative sepsis and endotoxic shock had produced DIC, a situation analogous to the experimental Schwartzmann reaction which can be produced with a single injection of endotoxin in an animal primed with steroids.

Summary

The term ARDS is of limited value. It provides a working diagnosis in those patients where the aetiology of the lung dysfunction is not apparent but acceptance of the term should not preclude a careful assessment of all possible causes.[44] Pulmonary oedema is easily produced by over-zealous fluid replacement in patients with increased alveolar capillary permeability and in many early cases this may have been an important precipitating factor. Despite fluid overloading, it is unusual for histological evidence of severe alveolar damage to be seen if infection or oxygen toxicity have not been factors.

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The Health of the Navy in 1978

M G Harper

ABSTRACT

This paper summarises the 1978 Health of the Navy Report. It is based on the 1978 In-patient Record Summary (F Med 14) returns and provides an analysis of the health indicators used in previous reports to assess the health of the Navy for the major International Classification of Disease (ICD) categories and some specific diseases. The paper concludes that based on these parameters the health of the Navy continues to improve although no account has been taken of major morbidity for social, cultural and psychological factors.

Introduction

The first Statistical Report of the Health of the Navy covering the period 1830-36 was produced by Dr John Wilson at the behest of Sir William Burnett FRS, the Physician General of the Navy.[1] Statistical Reports were published subsequently without interruption until 1936 except for the years 1844-53 and 1916-21. Since 1936 only three reports have been produced covering the years 1957-63[2] 1975[3] and 1976/77.[4] This report summarises and analyses the data for 1978.

Collection of Statistics

Since 1952 statistical data for Health of the Navy reports has been based on In-patient Summary Record (F Med 14) returns which are produced for all sickness episodes of 48 hours or more. The weakness of this system is that health statistics are biased towards in-patient data and do not identify general health problems or indicate major trends in naval health. Ideally the data should provide information on four general areas:

1. Levels of sickness and injury and their implications for absence from duty with particular emphasis on (a) identifying diseases which are reasonably common and about which the Navy can do something (b) identifying problems which are specific to the naval environment (c) identifying problems which can be controlled by the manipulation of the naval environment and (d) analysing the health benefits that can be derived for special care groups for example pilots marines and submariners.
2. Utilisation and provision of resources with special reference to maintaining an efficient wartime capability.
3. Monitoring the effectiveness of the Naval Medical Service.
4. Supporting medical research in areas relating to specific problems.

To achieve this would require morbidity data returns from sick bays in ships and establishments raising F Med 14s for all periods of in-patient treatment analysis of Out-patient Treatment Records (F Med 7) and record linkage of medical data to drafting data to produce details of periods spent in reduced medical categories.

In order to improve data collection in 1976 the Medical Director General (Naval) set up a Naval Health Statistics Steering Committee to advise on the policy for:

1. the collection of all Naval Health Statistics
2. the content presentation and analysis of health statistics with reference to the reports on the Health of the Navy
3. studies to investigate health trends

The Steering Committee consists of representatives from MDG(N) Commander in Chief Fleet Commander in Chief Naval Home Command the Institute of Naval Medicine Surgeon Rear Admiral (Naval Hospitals) Stats (G)4 under the chairmanship of the Surgeon Rear Admiral (Ships and Establishments)

The Steering Committee began by reviewing existing health statistics with a view to defining areas which could be improved Because of manpower shortages in ships and establishments and at Stats(G)4 the committee were unable to recommend the introduction of Out patient Record analysis or raising an In-patient Summary Record for all sickness episodes However the introduction of a computerised standardised weekly sick list is under consideration so that the general naval morbidity can be investigated further

With the recent transfer of the data base from the Cheadle Hulme computer to the Western Bureau at Devizes Stats(G)4 are now able to improve the analysis of F Med 14s and are moving towards integration with the HMS *Centurion* drafting computer in order to link personnel information with medical data Collecting and processing data takes time and enforces delay between the recognition of a problem and the provision of a solution

Health of the Navy, Summary for 1978

Strength of the total naval force and deployment pattern

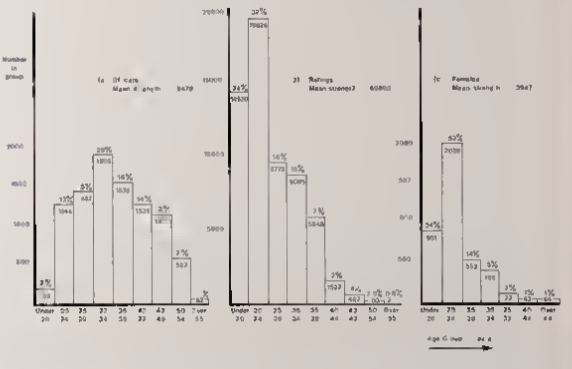
The total naval strength has remained relatively constant during the past four years with a gradual transfer from sea and abroad service to home service (Table 1)

TABLE STRENGTH OF THE ROYAL NAVY ON

Year	[illegible]	Afloat	Abroad	Home	Total strength
1974	[illegible]	[illegible]	24	5020	38543
1975	607	64	19	4918	7549
1976	280	4	168	[illegible]	65 0
1977	206	[illegible]	25	[illegible]	6

With the current deployment pattern of ships it is not possible to give any realistic breakdown from the medical point of view

FIG 1 – AGE DISTRIBUTION OF NAVAL PERSONNEL



of service in specific geographical areas

The differential age distributions for officers ratings and women are shown in figure 1 Over 90% of the total strength is under the age of 40 although 33% of officers are over 40

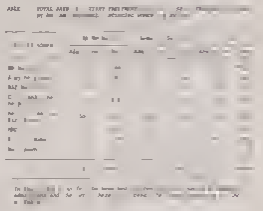
General trends

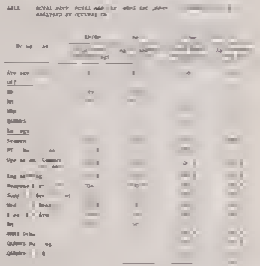
By including the 1953 data from the Health of the Navy Report 1953-63 [5] the marked improvement in sickness rates in the Royal Navy can be clearly seen (Table 2) The steady reduction in the number of in patient days continues with the current average days in patient treatment being 2 14 days per head compared with 5 7 days per head in 1953 However since out patient records are not routinely analysed it is not possible to determine whether the decrease in in patient treatment has been associated with an equivalent increase in out-patient treatment A breakdown of the use of medical treatment centres by Royal Naval and Royal Marine personnel is shown in Table 3

The in patient days relate to actual days treatment and do not include sick leave Taking this sick leave into account the total days lost due to sickness of over 48 hours duration amount to 190 727 or 2 56 days per head of force This gives an average non-effective rate of 0 7%

Sickness analysed by occupation The revised output tables no longer provide separate tables for officers and ratings The main differentiation is now between RN/RM males and the women s services Based on crude sickness rates admissions for the women s services are some 70% higher than for males Table 4 summarises crude sickness rates by occupation

Age The highest rate of sickness continues to be in the under 20 year age group with a rate of 290 9 admissions per 1000 strength with a gradual reduction through the age groups to a rate of 79 5 admissions per 1000 strength in the 50 54 year age group

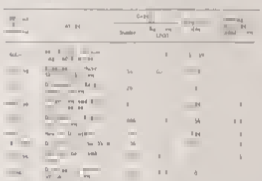




Causes of sickness The overall sickness pattern remains very similar to that of previous reports for 1975/76/77 with diseases of the respiratory system having the greatest number of episodes and accidents poisoning and violence cases requiring the greatest number of in patient days treatment Table 5 summarises the distribution of sickness episodes rates/

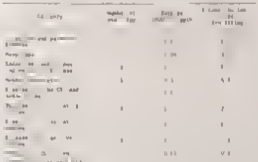
thousand strength and in patient days by ICD Diagnostic Categories

TABLE DISTRIBUTION BY SICKNESS OF SICKNESS RATES Sick Incidents And Total In-Pat. Days per 1000 STRENGTH CATEGORIES



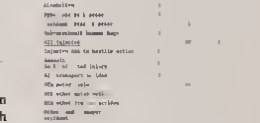
Invalidings The number of invalidings in 1978 dropped sharply to 273 compared with an average of approximately 350 per year for the previous three years The most striking change was in the mental disorder category where the numbers have decreased from 86 to 18 cases per year since 1975 In contrast invalidings due to musco skeletal disease continue to increase (Table 6)

TABLE CAUSES OF INVALIDING & STRENGTHS & RATE 1978



Deaths The overall mortality rate was not significantly different from recent years with a rate of 0 8i cases per 1000 (61 deaths) Accidental deaths (43) accounted for 70% of all deaths 18 of them occurring during sea service Twenty deaths were due to road traffic accidents compared with 31 in 1977 and 22 in 1976 There were no deaths in the women's services Table 7 summarises the causes of death for RN RM and women s services in 1978

TABLE 7 CAUSES OF DEATH FOR RN RM AND WOMEN S SERVICES 1978



Detailed Comments on Specific Disease Categories

Infective and parasitic disease Infective and parasitic disease accounted for 12% of the total sickness episodes and 8% of the total in patient days and showed little change from previous years Of the 1692 sickness episodes 509 were due to diarrhoeal disease and 421 to viral disease

Venereal disease remains relatively high with a total reported rate of 15 4 cases per 1000 strength or a total of 1 054 infections Approximately 70% of the episodes (689) arose from sea service There were 10 admissions for syphilis 233 for gonorrhoea one chancroid and 845 other and unspecified venereal diseases

Neoplasms Of the 118 neoplastic episodes 87 were benign and 31 malignant Apart from 7 cases of Hodgkin's disease there were no predominant types of malignancy and the 10 deaths in this group all resulted from different types of carcinoma In the benign group there were 22 cases of neoplasm of bone or cartilage and 15 lipomas Neoplasms accounted for some 3% of the total in patient days with an average stay time of 36 days

Endocrine nutritional and metabolic diseases The two predominant diseases in this group were diseases of the thyroid gland (8 cases) and diabetes mellitus (20 cases) together with 32 diseases of the blood and blood forming organs Of the 20 diabetes cases 15 were invalided

Mental disorders In-patient treatment of mental disorders again decreased significantly in 1978 and the 266 cases and 6 881 in patient days were approximately 50% of the 1975 rates The two main groups were alcoholism and alcohol addiction (102 cases) and personality disorders neurosis and non psychotic disorders (155 cases) The number of invalidings in this group have dropped from 86 to 18 cases per year since 1975 Causes of invalidings were neuroses (12 cases) alcoholism (3 cases) schizophrenia (2 cases) and personality disorders (one case)

Diseases of the nervous system and sense organs There were 292 admissions to medical units in this category resulting in 4 171 days in patient treatment with an average of 14 2 days per case Predominant cases were eye disease (34 admissions) epilepsy (39) otitis media (64) mastoid disease (27) other ear disease (25) The relatively high rate of invaliding in this category continued with a total of 47 invalidings made up of the following main groups — epilepsy 18 diseases of the ear 15 diseases of the eye 5

Diseases of the circulatory system This category accounted for 3% of the total in patient days with 301 cases and 4 907 in patient days and an average stay time of 16 3 days The predominant diseases were hypertensive disease (43 admissions) ischaemic heart disease (26) other heart disease (27) cerebro vascular disease (7) venous thrombosis and embolism (26) varicose veins (75) and haemorrhoids (67) Eight patients were invalided from the group of which five had hypertensive disease There were five deaths from heart disease and one from sub arachnoid haemorrhage

Diseases of the respiratory system This category made up 30% of all fresh cases with 4 263 admissions and 23 145 in patient days The average stay time of 5 4 days was the lowest for any of the disease categories Acute upper respiratory infections accounted for over half the admissions (2314) Other predominant diseases were influenza (571 admissions) pneumonias (95) hypertrophy of the tonsils and adenoids (105) and DNS (255)

Diseases of the digestive system There was a continuing reduction in both the number of admissions and in patient days in this category Admissions in 1978 (1 086) were 14% lower than in 1977 (1 252) while in patient days (11 564) were 18% lower than in 1977 (14 132) Predominant diseases were diseases of the teeth and supporting structures (424 admissions) peptic ulcer (81) gastritis (90) appendicitis (123) and hernia (81) There were only eight invalidings from this category — duodenal ulcer (3) gastritis (1) intestinal disease (2) liver disease (1) and disorder of the function of the stomach (1)

Diseases of the genito urinary system The

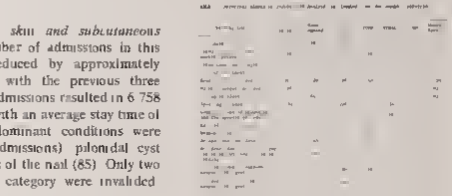
number of admissions in this category (504) has decreased gradually since 1975 (596) although the number of in patient days was similar to 1977 (5 879) Predominant diseases and those of interest were redundant prepuce (93 admissions) prostatitis (59) bacterial prostatitis (58) urinary calculus (17) and nephritis and nephrosis (5)

Diseases of the skin and subcutaneous tissue The number of admissions in this category has reduced by approximately 10% compared with the previous three years The 536 admissions resulted in 6 758 in patient days with an average stay time of 12 6 days Predominant conditions were cellulitis (138 admissions) pilonidal cyst (83) and diseases of the nail (85) Only two cases from this category were invalided both with eczema

Diseases of the musco skeletal system This category accounted for 17% of the total in patient days (27 767) and 11% of the total admissions (1 544) resulting in an average stay time of 17 9 days Predominating types of admissions were lumbalgia (400) internal derangement of joints (394) and displacement of intervertebral discs (135) The number of invalidings in this category continues to increase (91) and accounted for over one third (34%) of all invaliding s for the year Invalding diagnoses were as follows — arthritis and spondylitis (7) lumbalgia (16) internal derangement of the knee (9) other diseases of the joint (48) displaced lumbar discs (3) synovitis (2) osteochondrosis (5) and ankylosis of joint (1)

Congenital anomalies The number of admissions in this category remains small (61) Eighteen of the cases refated to anomalies of the spine but there were no other large groupings Seven cases were invalided from this category three of them as a result of spinal anomalies

Symptoms and ill defined conditions There were 703 admissions in which it was not possible to make a firm diagnosis This group accounted for 6 240 in-patient days with an average stay time of 8 9 days



Accidents poisonings and violence The principal causes of injury are shown in Table 8 After respiratory diseases injuries continue to cause the largest incidence of admission (29 8 per 1000) and account for almost 25% of in patient days The most frequent injuries were road traffic accidents (29%) sporting injuries (278) accidents due to falling or jumping including twisting slipping turning etc (251) late effects of injuries (206) assault (96) self inflicted injury (36) complications of therapeutic procedures (60) and occupational injuries (127) There was one battle wound and six weapon injuries There were 62 invalidings and 43 deaths in this category The deaths are summarised in Table 7

Special admissions Special admissions cover a wide ranging grouping of mainly investigative procedures Of the 344 admissions 82 were for removal of external splinting devices 98 for removal of internal splinting devices and 37 for elective surgery eg vasectomy

Discussion

As in the three previous reports the statistical data is based on the F Med 14 which is produced for all sickness episodes of 48 hours duration or more The validity of these figures is therefore dependent on first the In patient Record being raised and secondly on it being completed accurately A survey carried out in 1978 by Stats (G)4[6] showed that In patient Record Summaries were raised in only approximately 70% of cases appropriate to this action However the survey revealed that the more serious illnesses and those with long stay times were fully reported while minor illnesses eg flu and common cold particularly for personnel treated Sick on Shore were poorly reported Injuries were better reported than diseases If it is assumed that the yield of In-patient Summary Records is not significantly different from previous decades similar statistics may be comparable

As in previous years the largest incidence of illness is with respiratory tract infections influenza gastroenteritis musco skeletal diseases injuries and venereal disease Again the fact that two thirds of the deaths in the RN in peace-time were caused by injuries and not by disease highlights the need to intensify preventive measures

A comparison of the basic data presented in this report with the data for previous decades is shown in Table 9 and indicates that the health of the Navy based on admission rates continues to improve

Without details of out patient statistics it is not possible to say to what extent the move towards out-patient treatment has contributed to the decrease in in patient treatment Advances in treatment have occurred which allow patients to be treated while on duty for conditions which would previously have necessitated admission to hospital Other factors which may have contributed to the decrease in in patient days are

1 The decrease in the average duration of in patient cases from 13 6 to 11 6 during the period 1958 1978
2 The withdrawal of manned beds from the sick quarters of some shore establishments
3 The tendency for sailors to marry at a younger age and therefore to be more frequently treated at home for minor illnesses
4 Similarly single persons have been allowed to live out since 1970 and again are probably treated at home for minor illnesses

However health is something more than the absence of disease and since the 1953 report the area of interest of the RN Medical Service has been broadened beyond the physical and physiological aspects of performance to include social cultural and psychological factors

This report summarises the Health of the Navy Report for 1978 Although the Health of the Navy Report forms an historical record it also points to significant trends or departures from the norm which should concern management or give rise to management decisions A further breakdown of the statistics contained in this paper can be obtained through Stats(G)4

Acknowledgement

I am most grateful to Mr Bruce Oclman Head of Stats(G)4 Stanmore for his assistance in the preparation of the tables

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Oesophagitis*

R H Hunt

Part 1. Acid Reflux and Oesophagitis

Although reflux of acid gastric contents occurs in most people from time to time it usually passes unnoticed Symptoms may develop however if it becomes frequent if the volume of refluxed contents increases or the mucosa of the oesophagus becomes more sensitive to the presence of reflux

Symptomatic reflux may occur after operations on the gastro-oesophageal region of the stomach such as partial gastrectomy truncal vagotomy or cardiomyotomy and in patients with motility disorders such as scleroderma

Oesophageal Damage

The refluxed contents of the stomach are acid and may contain partly digested food when reflux occurs after a meal In addition to acid other important constituents of the gastric juice can cause damage to the oesophageal mucosa when refluxed from the stomach for example the enzyme pepsin secreted together with acid from the stomach Duodenal contents may reflux through the pylorus into the stomach and in turn be refluxed into the oesophagus The damaging components include bile acids lysolecithin and pancreatic enzymes The presence of bile in the oesophagus may lead to severe oesophagitis and the infusion of bile acids will cause pain in patients who are known to have oesophagitis However it is probably the combination of bile acid and pepsin which produces the mucosal damage in oesophagitis (fig 1)

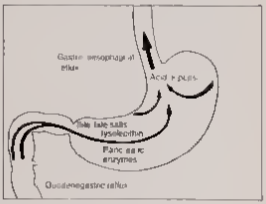

Fig 1 *Constituents of gastro-oesophageal reflux*

Symptoms

Symptoms of reflux are most commonly those of heartburn This is periodic at first and usually only present after large meals or dietary indiscretion It may then become more frequent and will be aggravated by a sudden gain in weight when bending over or when lying flat It may then occur after all meals and be associated with odynophagia or with a bitter acid reflux of gastric contents into the mouth In severe cases this can lead to aspiration and pneumonia but this is a less common complication than in patients with achalasia

Mechanisms of Prevention

Three mechanisms act to prevent the reflux

This material was originally published in a booklet on Oesophageal Disorders by Update Books Ltd London and is reproduced with the kind permission of the publishers

1 The lower oesophageal sphincter is the main mechanism for preventing reflux of gastric contents into the oesophagus and is the physiological sphincter which occupies the lower 3 to 4 cm of the oesophagus The way in which the sphincter responds to various stimuli is outlined in Table I Several important clinical points however are relevant to the advice to be given to the patient In addition to the various pharmacological stimuli which either increase or decrease lower oesophageal sphincter tone various dietary factors can influence it A meal high in protein increases sphincter tone whereas fatty meals lower it and make reflux more likely This relaxation of sphincter tone also occurs after eating chocolate drinking coffee or alcoholic drinks and especially after smoking Anticholinergic drugs will aggravate the symptoms of oesophageal reflux and should not be used in dyspeptic patients in whom heartburn is present

TABLE I LOWER OESOPHAGEAL SPHINCTER RESPONSE

	Increases oesophageal sphincter tone	Decreases oesophageal sphincter tone
Protein meal	Gastrin Motilin	Fatty meal Secretin
Carbohydrate meal	Gastrin Motilin	Fatty meal Secretin
Peptic ulcer drugs	Metoclopramide	Anticholinergic drugs Antacids
Smoking	Catecholamines Prostaglandin $F_{2\alpha}$	Nicotine Cholecystokinin Glucagon Prostaglandin E_2
Alcohol	Fundic hormone	Vagotomy
Coffee	Gastrin Meal	Pancreozymin Cholecystokinin Secretin Glucagon Intestinal hormones
Chocolate		Secretin

2 The second method of defence against reflux is secondary peristalsis which responds to reflux of air and gastric contents into the lower oesophagus This peristalsis sweeps the refluxed contents back into the gastric fundus

3 The third defence mechanism is the one to one and a half litres of alkaline saliva which is swallowed each day This neutralizes the small quantities of acid which may be present within the oesophageal lumen under normal circumstances

Consequences of Reflux

The first effect of gastro-oesophageal reflux is a change in the stratified squamous epithelium of the oesophagus In the normal oesophagus the vascular papillae extend about half way to the surface of the mucosa (fig 2) The early effects of reflux include an increase in the rate at which the surface cells of the squamous epithelium are lost and an increase in the turnover of the basal germinal layer to compensate for this The vascular papillae elongate and reach towards the surface epithelium (figs 3 & 4) This situation may occur without the presence of any inflammatory cells and is therefore not truly oesophagitis However if reflux persists then round cell infiltration does occur and a true inflammatory response is seen (fig 5)

This progression towards true inflammation is associated with superficial erosions and blood loss Bleeding is seldom rapid and only rarely leads to haematemesis Slow blood loss can lead to anaemia if it is persistent especially in the elderly The appearance of this lesion can be clearly identified at endoscopy frank ulceration may be seen in severe cases The presence of an oesophageal ulcer may lead to the development of peptic stricture

Fig 2 *Normal oesophagus H & E x 67 (Figs 2 3 4 & 5 are reproduced by courtesy of Surgeon Lieutenant Commander J D Buchanan)*

Fig 3 *Oesophagitis. Hyperplasia of basal cell layer (papillomatosis) with elongation of papillae and basal cell hyperplasia. H & E ×100*

Fig 4 *Oesophagitis. Minimal inflammation. Basal cell hyperplasia with mitoses. H & E ×100*

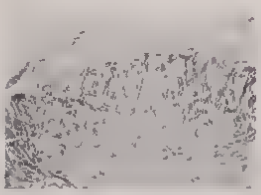

Fig 5 *Oesophagitis. Florid inflammation. Ulcerated epithelium with a thin layer of granulation tissue and fibrin on the surface. Intense acute and chronic inflammatory infiltrate. H & E ×160*

Barrett's Oesophagus

When oesophagitis is severe and extensive, changes may take place in the mucosa as it heals. Instead of the mucosa regenerating with squamous epithelium it may be replaced by the columnar epithelium of the cardia which may be more resistant to acid and pepsin than the squamous epithelium. When this columnar metaplasia occurs circumferentially it is usually termed a Barrett oesophagus. Further oesophagitis may however still occur with or without stricture and may be associated with malignant change.

Stricture

In the early stages of reflux disease stricture may be present and due solely to oesophageal muscle spasm acting in response to the inflammation. This situation is a manifestation of the disordered motility frequently seen in patients with acid reflux disease and the presence of this muscle spasm may add to the pain of oesophagitis.

Peristalsis is reduced and oesophageal clearing of refluxed acid and gastric contents is less effective. This in turn aggravates the oesophagitis and establishes a cycle of cause and effect.

True peptic strictures in the oesophagus are the result of recurrent ulceration which is usually severe. At the start the fibrosis is limited to the submucosa but will also involve the smooth muscle layer if the process is not arrested. These strictures most commonly occur in the distal third of the oesophagus and usually at or just above the cardia. They may however occur anywhere within the oesophagus and may also be seen in association with hiatus hernia.

Diagnosis

History. The diagnosis of acid reflux and oesophagitis may be obtained from a careful history which will include heartburn and aggravation by posture, tight clothing, large meals and dietary indiscretions. Pain may occur at night especially on lying down and

may prevent the patient from going to sleep

Physical examination The physical examination of the patient is unlikely to be helpful in the diagnosis of uncomplicated oesophagitis unless a rapid weight gain is noted It is important to exclude any other cause of chest pain and to examine the heart cardiovascular system and lungs in order to reassure the patient that he does not have heart disease

Investigations A haemoglobin estimation red cell indices and blood film will detect anaemia which may be present secondary to chronic blood loss It is wise to take chest x ray and an ECG may be helpful in excluding cardiac abnormality in those cases where the complaint of chest pains causes diagnostic confusion

Radiology The barium swallow may show the presence of reflux when the patient is tipped on the x ray table and the presence of a hiatus hernia may also be seen at this examination It is important to remember that the absence of clear evidence of reflux does not mean that the patient has no reflux problem

Endoscopy Although endoscopy may show no evidence of oesophagitis at the time of the examination the lower third of the oesophagus should be biopsied in those patients in whom acid reflux is suspected This may show early histological changes

More usually the changes of true oesophagitis are recognised The characteristic feature is linear inflammation with areas of apparently normal mucosa in between These reddened linear streaks may show superficial ulceration

Acid studies Occasionally the Bernstein acid perfusion test may be of use in those patients in whom the diagnosis of chest pain remains unclear despite all previous investigations Formal tests of stimulated acid secretion are of no value in the diagnosis of [illegible] reflux oesophagitis

Hiatus Hernia

Hiatus hernia involves the terminal 1 to 2 cm of the oesophagus which lie within the abdomen and are subject to intra abdominal pressure This part of the oesophagus and the cardiac portion of the stomach move into the chest through the oesophageal hiatus of the diaphragm

In those patients who have a hiatus hernia the hernia may not be present all of the time but the potential to herniate is abnormal The hernia may only occur on lying down or when the intra abdominal pressure rises on coughing or straining

Hiatus hernias are usually classified as sliding direct or bell-shaped and rolling para oesophageal hernias In sliding hiatus hernia the position may make the oesophagus appear shortened on the barium swallow but true shortening seldom occurs. Mixed hernias with features of both types are not uncommon

The sliding form of hernia is 3 to 10 times as common as the rolling form and mixed hernias together Rolling hernias are 10 times more common in women than in men

The major symptoms of hiatus hernia are those of reflux and oesophagitis but the rolling type may produce symptoms due to the herniation itself and rarely may cause severe prostration of the patient due to strangulation of the hernia Coexistent peptic oesophagitis may progress to erosion ulceration and blood loss leading to anaemia or to stricture formation

The symptoms which are often attributed to hiatus hernia are varied and may be confused with those due to coronary artery disease pancreatitis biliary colic gastric or duodenal ulcer and other oesophageal disease

The barium swallow provides an opportunity to identify this lesion and decide whether reflux is present When the patient is tipped head downward or intra abdominal

pressure is raised during the investigation both the oesophageal hiatus and anti-reflux mechanisms are challenged The lesion may not be seen at the barium examination even in a patient who has the potential to herniate and endoscopy may be helpful in identifying the presence of oesophagitis although this investigation may not always reveal the presence of a hernia itself

Treatment is essentially that of reflux (Part 2) but hiatus hernia may require surgical treatment especially when complicated by strangulation perforation oesophageal obstruction respiratory embarrassment or when there is chronic blood loss which has been shown not to come from any other site

Practical Points

When dealing with oesophageal disorders remember

Reflux is common at the extremes of life and during pregnancy Although it may occur with hiatus hernia both reflux and hiatus hernia may occur without each other

Untreated reflux oesophagitis may progress to ulceration which can be complicated by bleeding and anaemia Peptic strictures may ultimately occur

A sudden rapid gain in weight may precipitate symptoms of reflux

Although hiatus hernia and its symptoms may be present only intermittently the potential to herniate is abnormal Symptoms of hiatus hernia may be confused with coronary artery disease biliary disease gastric or duodenal ulcer and pancreatic disease

Part 2. Medical Treatment of Oesophagitis

Reflux of gastric contents into the oesophagus occurs intermittently in most people and usually passes unnoticed When it becomes symptomatic it may at first be occasioned only by such things as dietary indiscretion or an excess of alcohol and the patient will probably not seek medical help When symptoms become persistent however it is important for the physician to take the problem seriously in order to prevent progression to ulceration and stricture

Many patients who are experiencing discomfort or pain in the chest will be anxious because of this and the physician should remember how important it is to reassure the patient that he does not have heart disease providing of course that this has been excluded He should explain to the patient that his condition is of high nuisance value but that providing he takes the advice given to him it is unlikely to become more serious

Having given this reassurance the management of reflux oesophagitis should be considered under two broad lines of approach The first is the advice which can be given to the patient and is based upon knowledge of the physiology of the antireflux mechanisms and in particular of the behaviour of the lower oesophageal sphincter The second line of approach is the use of specific pharmacological agents

Advice

The advice that should be given to the patient is summarised in Table 2

TABLE 2 – *ADVICE BASED ON PHYSIOLOGY*

Stop smoking
Lose weight
Eat smaller meals
Reduce fatty food
Avoid chocolate coffee alcohol acid fruit drinks tight garments low chairs
Raise bed head 20 to 30 cm

Cigarette smoking Cigarette smoking reduces the lower oesophageal sphincter pressure which then allows reflux to occur Although this effect is of relatively short duration many people smoke following a meal when the stomach is full and acid secretion is stimulated Heavy smokers may maintain their lower oesophageal sphincter pressure at a reduced level for long enough periods for significant reflux to occur All smoking should therefore be discouraged and the reasons clearly explained to the patient who will find it easier to comply if a reasoned argument can be given by his doctor

Diet Much dietary advice given by doctors is based on fantasy rather than fact. There is good evidence however for advising patients with reflux not to eat fatty meals, for these decrease lower oesophageal sphincter pressure as do xanthine containing foods (such as chocolate and coffee) and alcohol There is some evidence that carminatives such as peppermint may decrease sphincter pressure and this has been used by some as an argument against the use of antacid preparations which contain peppermint flavouring Acid fruit drinks are best avoided not because of any direct effect on the sphincter but because they may aggravate pain from oesophagitis and cause odynophagia.

Weight loss Patients who complain of the symptoms of reflux have often noticed the onset of symptoms soon after a gain in weight and that with successful weight loss their symptoms abate. Some patients attribute this directly to a decrease in intra abdominal pressure but these symptoms have not been satisfactorily explained it may well be due to the reduction in rich fatty meals and also the size of the meals Weight loss should be encouraged in all those who are to any degree overweight.

Size of meals Symptoms of reflux are often worse after large meals but there is little evidence that large meals alone cause reflux The stomach can distend considerably without an increase in intragastric pressure (receptive relaxation) and the mechanical effects following a large meal are more likely to be associated with adverse changes in posture Large meals are also more likely to contain more fat It seems wise therefore to advise the patient to take smaller meals

Posture Reflux is less likely to occur when the patient is erect and when gravity assists oesophageal clearing The patient must be advised to avoid postural changes which aggravate his symptoms or may cause reflux Stooping and bending especially after meals should be avoided It is common for people to eat their evening meal on their lap sitting in a low chair before the television and this practice should be avoided in any patient with reflux symptoms They should be encouraged to eat an unhurried meal sitting on an upright chair at the dining table Tight under garments and belts should not be worn as they may increase intragastric pressure and aggravate symptoms

Sleeping Symptoms at night may be avoided by advising the patient to raise the head of the bed on blocks books or bricks The ideal height is 20 to 30 cm (8 to 11 inches) higher than the foot of the bed and this has been shown to reduce significantly both the duration and frequency of gastro-oesophageal reflux Despite the relative inconvenience of carrying out this advice patients obtain great benefit from this move and they should be given all the encouragement necessary to take this advice when symptoms are troublesome Pillows do not provide an effective alternative Some patients may have noticed that sleeping on their left side or in the prone position is helpful and this benefit is probably due to the anatomical relationship of the gastro-oesophageal junction in these positions

Pharmacotherapy

The drug treatment of reflux oesophagitis

relies on three main lines of approach
1 To reduce acid
2 To reduce reflux
3 To increase mucosal resistance

Reduction of acid. Because the presence of acid within the oesophagus is considered an important factor in the aetiology of oesophagitis, antacids have been widely used in the treatment of this condition. Alkalis may be prescribed in liquid or tablet form and should be taken in standard dosage one and three hours after a meal and on retiring at night. The dosage which is given will vary with each preparation and depends upon the buffering capacity of the specific antacid preparation. Alkali treatment used in this way will neutralise acid within the lumen of the oesophagus, will coat the oesophageal mucosa and also neutralise acid within the stomach. There may be some prolonged benefit from a rise in lower oesophageal sphincter pressure which has been observed following the ingestion of alkali. When taken regularly over a prolonged treatment period alkali therapy has been observed to reduce mucosal sensitivity to the acid perfusion test, which suggests that true healing does take place. Alkali preparations are available in a variety of combinations which may have some additional benefits.

Alkali plus alginate. The combination of antacid with alginic acid (Gastrocote, Gaviscon) produces on swallowing a viscous raft of foam which floats on the gastric contents. If reflux takes place this raft on the gastric contents is regurgitated into the oesophagus and forms a protective layer on the oesophageal mucosa. The presence of this viscous foam may reduce reflux by its own mechanical effect. Although these are alkali preparations, the antacid is tightly bound to the alginic acid. The buffering capacity of such preparations is very low and lower oesophageal sphincter pressure is unaltered. Raft preparations are available as tablets, sachets of granules or as a suspension and should be taken after meals and at night. These preparations, like simple alkalis, may be used for the heartburn of pregnancy.

Alkali with defoaming agent. Antacid preparations are available combined with polymethyl siloxane (Asilone, Alcin, Antasil, Andrasil, Polycrol). Polymethyl siloxane is a defoaming agent which some believe gives benefit in oesophagitis although there are no controlled data to support this. It is important to remember that antacid preparations containing defoaming agents should not be prescribed to patients who are taking antacid/alginate raft preparations because the defoaming effect will destroy the efficacy of the raft.

Alkali with oxethazaine. Antacid has been combined with oxethazaine (Mucaine), a local anaesthetic preparation which can be of benefit for the heartburn and pain of oesophagitis. The relief of discomfort is due to the local anaesthetic effect on the oesophageal mucosa combined with the antacid properties of the vehicle.

Hydrotalcite. Hydrotalcite (Altacite) is a relatively new antacid preparation. It has an effective buffering capacity and is claimed to have a greater affinity for binding bile salts than aluminium or magnesium hydroxide. It may therefore be used with benefit in patients who are suffering from bile reflux. It is also available combined with the defoaming agent dimethicone (Altacite Plus).

Anticholinergic drugs. Although anticholinergics have been widely used in the treatment of peptic ulcer to decrease acid secretion, there is no place for their use in reflux oesophagitis. They reduce the volume but not the concentration of acid secreted by the stomach and they delay gastric emptying. They have a directly adverse effect on the lower oesophageal sphincter by reducing its

restiug toue. Auticholinergics also decrease the volume of alkaiue saliva thus reduciug the bufferingeffect of swallowed saliva withiu the oesophageal lumen

Histamine H_2 receptor antagonists The stimulatory effects of histamiue on gastric secretiou have been knowu siuce 1920 The failure of conveutional antihistamiues such as mepyramiue to block this effect suggested a second histamiue (H_2) receptor The first uf the gruup of histamine H_2 receptor auta gouists was described in 1972 aud the third drug of this group cimetidine (Tagenet) has been available for the treatmeut of peptic ulcer for just over three years

Cimetidine decreases basal aud uocturual acid secretiou and acid secretion stimulated by a meal histamiue pentagastrin or insulin induced hypoglycaemia This effect is seeu as a reductiou in both the volume and the acidity of the gastric secretion Pepsin output is also reduced but to a lesser extent than that of acid The role and benefits of cimetidine in the treatmeut of duodenal ulcer and benign gastric ulcer are clearly established but it has so far received relatively little atteution for the treatmeut of gastro oesophageal reflux The ability to rednce acid output by an effect on volume and concentration makes a rational argument for the use of cimetidine in the treatment of reflux oesophagitis. Controlled trials have shown a decrease in the freqneucy and severity of heartburn in the consumptiou of antacids aud in the mucosal sensitivity to the acid perfusion test In another study both endoscopic and histological criteria showed a significant improvement after treatmeut with cimetidine

The aetiology of oesophagitis is complex and may involve bile salts pancreatic enzymes and lysolecithin in addition to acid and pepsin Cimetidine may need to be used in a dose of 400 mg q d s and treatmeut continued for 12 to 16 weeks in combination with other agents to obtain improvement

No serious side effects of cimetidine have occurred but patients occasionally complain of tiredness muscle pain or rash Transient biochemical abnormalities of serum creatinine or transaminases may occur in some cases and breast tenderness and gynaecomastia have occurred in a few male patients Confusion has been reported occasionally in elderly patients and this may be more likely at a higher dosage

For patients with reflux oesophagitis cimetidine should only be given when the diagnosis has been established by prior investigation

Reduction of reflux Symptoms of heartburn and reflux have been traditionally treated by drugs which reduce intragastric acidity Metoclopramide (Maxolon Primperan) is a drug which acts by potentiating the action of acetylcholine It restores normal peristaltic activity to the oesophagus and enhances the resting tone and pressure of the lower oesophageal sphincter By increasing the number and depth of muscular contractions of the stomach gastric emptying is improved and pyloric reflux is reduced

Metoclopramide is usually prescribed in a dose of 10 mg either three or four times a day It acts within half an hour and is therefore of most benefit when given either with or at the end of a meal There are few side effects but extrapyramidal reactions usually of dystonic type have been reported and appear to be particularly closely related to taking the drug in children and young adults

The action of metoclopramide on the motility of the gastrointestinal tract is antagonised by the concurrent use of anticholinergic drugs These should not be used in patients with reflux disease for the reasons already discussed

Increase in mucosal resistance. Carbenoxolone sodium (Biogastrone) is a derivative of glycyrrhizinic acid which is obtained from an extract of liquorice root It has been shown to

accelerate the healing of both gastric and duodenal ulcers This compound has no effect on gastric acid secretion and appears to work by increasing the life span of gastric epithelial cells by stimulating mucus production and by decreasing hydrogen ion back diffusion through the mucosa Preliminary trials for oesophagitis showed carbenoxolone to have no benefit but it has recently been combined in a raft preparation with antacid and alginate (Pyrogastrone) The first studies with this new carbenoxolone preparation have shown that it is significantly better than using the raft preparation alone The results of further studies are awaited with interest

The dose of carbenoxolone which is used in this new preparation is lower than that used for the treatment of gastric or duodenal ulcer It is hoped that this will avoid the relatively high incidence of dose dependent side effects which occur with carbenoxolone although in the first study some side effects were observed The complications are due to the mineralocorticoid adrenocorticotrophic like and antidiuretic hormone potentiating effects Patients have to be closely watched for hypertension weight gain oedema and hypokalaemia which may present as muscle weakness or lethargy Patients who are treated with carbenoxolone should be seen at weekly or fortnightly intervals when their blood pressure and weight should be checked

Hypokalaemia usually responds to potassium supplements such as slow release (Slow K Leo K) or effervescent (Sando K) tablets Fluid retention may be corrected with thiazide diuretics Spironolactone (Aldactone) should not be used as a diuretic because this antagonises the specific ulcer healing properties of carbenoxolone Elderly patients or those who are being treated with digoxin require close monitoring of their electrolytes because of the potentiation of digoxin effects by hypokalaemia Because of these side effects patients should only be given carbenoxolone for reflux oesophagitis once the diagnosis has been established

Summary of Management

It is important to take time to provide patients with an adequate explanation and reassurance and to give them the advice which is so relevant for successful management especially stressing the importance of weight reduction and stopping smoking

Most patients will respond to the use of a raft preparation taken after meals and at bedtime and if symptoms are still present an antacid preparation should be taken one and three hours after a meal and at night in addition to the raft preparation If these measures fail to control the symptoms metoclopramide should be used and the patient told to raise the head of the bed at night Consideration should be given at this stage to more intensive investigation such as endoscopy If inflammation an ulcer or a stricture are present the use of cimetidine or carbenoxolone should be considered

When progress is good treatment may be reduced by withdrawing antacid doses between meals and lowering the bed head It is wise to continue the raft preparation while metoclopramide is reduced and ultimately withdrawn

If this formula fails to produce relief patients will occasionally respond to intensive in patient treatment when it is often easier for them to co operate with the advice and treatment given Once the patient has experienced relief in hospital he is more likely to co operate on an out patient basis

Practical Points

Patients with chest pain are anxious about the possibilities of serious cardiac or pulmonary disease and when the diagnosis of reflux oesophagitis is made they should be reassured

Cigarette smoking should be stopped and fatty meals reduced because they both reduce lower oesophageal sphincter pressure Meals should not be eaten from the lap in low chairs in front of the television. Patients should not

wear tight undergarments and belts and should avoid bending and stooping

Troublesome symptoms at night may be alleviated by raising the head of the bed 20 to 30 cm on blocks Extra pillows do not provide a suitable alternative.

Antacids should be taken one and three hours after meals and at night. Those alkali compounds which contain a defoaming agent should not be prescribed together with an alkali/alginate raft preparation because the defoaming action will destroy the efficacy of the raft.

Anticholinergic drugs should not be prescribed as they reduce lower oesophageal sphincter pressure and delay gastric emptying

When carbenoxolone preparations are used patients should be carefully monitored for the side effects of fluid retention hypertension and hypokalaemia. This is especially true for those who are elderly

Decompression Injuries in the Temporal Bone*

P W Head

The Royal Naval Hospital Haslar at Gosport is situated some half a mile from the Institute of Naval Medicine in which is housed the Deep Dive Trials Unit and the Environmental Medicine Unit In that Diving Trials Unit the world's deep diving record was achieved in 1972 a depth of 1800 ft being reached The proximity of the Diving Unit to the clinical facility in the Naval Hospital prompted the author's interest in diving medicine related to the ENT speciality It was also relevant that available for clinical study was a captive team of naval divers who could be observed and examined periodically during their 20 or so years in the Royal Navy as divers

Diving in one form or another has been practised since the days of Alexander the Great who used divers to destroy the boom defences of Tyre in 332 BC However until relatively recent times the depth reached underwater has been limited by equipment and techniques employed Even pearl fishermen in the Orient whilst free diving are limited to achieving a depth of no more than 100 ft During the past three decades military and civil interest in underwater activity has increased enormously to say nothing of the increase in scuba diving as a sport

By the very nature of diving activities in often remote and scattered situations a full evaluation of the patho physiological lesions associated with a hyperbaric environment have been difficult to assess Cochleovestibular symptoms may be transient and occur underwater — full subjective recovery being noted within a few hours For those not familiar with diving it may be pertinent to point out that following a deep saturation dive to 300 metres or so it may be 9½ days before a diver is fully decompressed and in a situation where a complete otoneurological workout is possible Even if a specialist in ENT were able to evaluate a diver in a decompression chamber sophisticated test equipment will not always perform accurately in a positive pressure environment

One must pay tribute to those who have carried out the pioneer work in this field in particular Farmer (1977) and McCormick (1970 1973) in the United States and Edmonds Freeman Tonkin and colleagues (1972 1973 1976) in Australia At the same time the concept of round window fistula indicated by Goodhill in 1971 provides an answer to some of our previously unexplained otological diving problems

Despite the great strides made in providing underwater man with an ambient environmental atmospheric pressure for example in miniature submarines bathyscapes and fully armoured suits the majority of work undertaken requires an individual to have more freedom of movement Today therefore reliance is still placed on the employment of hard hat divers in traditional suits and scuba equipment in one form or another In such equipment man is exposed to the variations in pressure of the surrounding

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water

At this point it is pertinent to reconsider some of the physics applicable to the diving situation so that one can appreciate how the middle and inner ears may be involved in a temporary or permanent pathological process. Our normal environment exhibits a pressure of some 14·7 lbs per square inch (psi) that is atmospheric pressure. Under water the pressure rises rapidly in a linear manner at 33 ft (10 metres) the pressure has doubled to twice that at the surface i.e. it is two atmospheres and at 66 ft (20 metres) the pressure is three atmospheres or 44·1 lbs per square inch. A container of air which is open at the bottom will contain half as much at 33 ft (10 metres) as it does at the surface. At 66 ft (20 metres) the volume of air is reduced to one-third of that at the surface. Applied to diving this affects all air containing spaces in the body including the middle ear cleft although both this cavity the external meatus and the paranasal sinuses require special consideration as they are incompressible bony structures with openings which may or may not be patent and permit the easy equalization of ambient pressure changes.

At depth and great partial pressures nitrogen is absorbed into the body tissues and fluids especially in fatty areas. During decompression that is with reduction of ambient pressure nitrogen may form bubbles in any tissue because it is being released faster than it can be carried by the blood stream to the lungs and so dispersed. Such bubbles may form in the microcirculation and/or nervous tissue they may well occur in the inner ear resulting in vestibular or cochlear lesions or in the nerve pathways and central connections of the eighth cranial nerve. This is a form of bends or decompression sickness. The term 'bends' arose in the 1800s and is derived from the Grecian bend a fashionable gait adopted by the young ladies at the time. Compressed air workers partially incapacitated by decompression sickness tended to adopt this posture for ease of movement. In its broadest sense decompression sickness must include any abnormality which is the direct consequence of reduction in environmental pressure. To minimize the possibility of bends divers are subject to strict decompression routines which in brief may require days of staged decompression following deep saturation dives whereas it may only have taken a diver a very short time to reach his working depth from the surface. In addition helium is used to replace nitrogen as the inert gas in the breathing mixture. This also reduces the tendency to nitrogen narcosis. The breathing of pure oxygen would normally lead to oxygen toxicity and convulsions in these circumstances.

With the foregoing in mind it is convenient to consider the possible ENT pathology which may be associated with the decompression phase of diving. In this phase symptoms and signs are more likely after long and deep dives but they have been recorded after relatively shallow dives and short periods of exposure to the hyperbaric environment.

First what is the magnitude of the problem? Various authors and Royal Naval experience suggest a bends problem in about 1 per cent of divers and that of this number some 5 per cent will involve the temporal bone. It will be appreciated that not only is the temporal bone subject to bends but the middle ear cleft ossicles and tympanic membrane may be damaged by straightforward inability to equalize pressure on either side of the drum that is by otitic barotrauma. These have been well documented elsewhere and are similar to those experienced by swimmers and aviators; they are not part of the decompression syndrome as such. With two exceptions the following remarks will be confined to decompression sickness as it affects the inner ear nerve pathways and central connections.

The two exceptions relate to the patency of the eustachian tube. Normally due to the

flutter valve mechanism of the medial end of the eustachian tube there is a passive venting of excess pressure in the middle ear cleft into the nasopharynx during decompression that is during ascent to the surface Occasionally there is an abnormally high elastic resistance of one or other tubal cartilage allowing relative over pressurization of the middle ear cleft A similar situation may result from a forced Valsalva manoeuvre with a sudden unilateral increase of middle ear pressure Rapid uncontrolled pressure of this type may cause ossteulnr disruption perforation of the drum or possibly uncorking of the stapes footplate At least it may cause turbulence of the perilymph in the otic capsule such reaction resulting in damage to the basal turn of the cochlea with permanent sensorineural high frequency hearing loss Unilateral stapedial movement may also result in stimulation of the ipsilateral vestibule and sequential vertigo—the alterno baric vertigo described by Lundgren in 1973

Similarly accepting Goodhill s implosive pathway for the production of a round window fistuln sudden or more commonly progressive sensorineural hearing loss or vertibular deficit will take place The author has personally confirmed such a pathway by closure of a round window fistula which appeared following a forced Valsalva manoeuvre in a diver attempting to clear his ears Any diver who overcomes a temporary eustachian blockage by a forced Valsalva manoeuvre is at risk of sustaining an immediate or delayed sensorineural hearing loss The immediate loss which is constant from the moment of barotrauma is almost certainly due to the pressure wave affecting the inner ear being transmitted by sudden involvement of the stapes or round window membrane The delayed onset and progressive end organ sensorineural hearing loss or vestibular deficit is more likely to be associated with a round window fistula and perilymph leak into the middle ear cleft Such loss if not recognised frequently becomes total and permanent The differential diagnosis between these two types of cochlear loss using the criteria mentioned is not clear cut but the only proven cause of inner ear barotrauma is a round window fistula nnd therefore n tympanotomy should he considered in nll cases

Decompression sickness involving only the inner ear can be confusing It has become recognised more recently following deep saturation dives where helium is used as the inert part of the breathing mixture For reasons unknown the tendency is toward either a vestibular lesinn or a cochlear lesion rarely both Such incidents occur early in the decompression cycle when a changeover is made from oxy helium to compressed air as the breathing mixture According to Edmonds and his colleagues (1972, 1973) an acceptable answer to this syndrome may be the diffusion of gas across the round window the inner ear being able to net independently in its ability to dissolve and release helium

The inner ear is unique in possessing the only extracellulnr fluid space which does not require the inert gas to be transported via the circulation The perilymph may rapidly become saturated for example with helium by diffusion across the thin round window membrane With a different gas saturation of the endolymph osmosis may promote damage to the neurnsensory epithelium Secondly the counter diffusion of two inert gases across the round window membrane mny result in bubble formation at the interface between the middle and inner ears This is understandable when the breathing mixture is changed during decompression the perilymph being saturated with helium and the middle ear cleft with nir Even though decompression is not required to explain this phenomenon damnging effects of the bubbles on either the round window membrane or the neurosensory epithelium would be enhnnced by the expansion in accordance with Boyle s Law

During decompression dissolved gas must

return to the gaseous state ideally via the lungs. If decompression is too rapid gas bubbles may form and increase in size in soft tissues blood vessels endolymph/perilymph and the cochlea/vestibular epithelium Obesity cold and dehydration plus age predispose to bubble formation The production of a bubble is accompanied by alteration in the blood chemistry at the blood/bubble interface. The blood supply to the cochlea and the vestibule is tenuous it consists of end arteries with poor anastomotic channels Obstruction to the blood flow will result in serious and often permanent damage to the tissues supplied In decompression sickness bubbles may occur in any part of the membranous labyrinth the blood vessels or associated auditory pathways and central connections (bubble emboli) Bubble formation in the cerebellar pathways may produce a clinical picture resembling a vestibular lesion McCormick has noted loss of cochlear hair cells and haemorrhage

It has been noted by many observers that in the hyperbaric situation and during decompression certain changes occur in the blood vessel walls of the microcirculation as well as in blood chemistry itself In 1976 Wells and his colleagues recognised the presence of reduced capillary blood flow and random stasis in the microcirculation an important observation when the inner ear is considered It is generally agreed that blood viscosity increases with haemoconcentration and a hypercoagulable state Where stasis occurs there is oedema of the walls of the microcirculation and sequential change in osmotic function again important in relation to the perilymph and endolymph interface in the cochlea. Serum lipids and cholesterol levels are slightly elevated in the hyperbaric environment

Martin and Nichols in 1972 and Philip and his colleagues (1971 1974) at the Institute of Naval Medicine recorded a significant depression in the circulating platelet level due to the collection of platelets around the surface of developing nitrogen bubbles and forming platelet emboli Bubbles in the blood enhance clotting by their effect on Factor 12 although these changes are widespread their possible effect on the delicate membranous labyrinth cannot be ignored Degeneration of the epithelium can occur from bubble formation platelet or lipid emboli. In 1973 McCormick recorded the interesting observation that whales and porpoises which regularly surface from great depths are protected from some of these problems by a lack of Factor 12 in their clotting mechanism and the presence of a heparin like substance in their blood It is clear from the foregoing that recompression is required as an urgent treatment for the various forms of decompression sickness and that the employment of heparin or Dextran 40 may be indicated in an attempt to prevent permanent damage

Turning for a moment from the esoteric to the mundane one should never forget that there is frequently a noise level of 120-130 dBA in diving chambers and helmets Auditory protection is not feasible in such situations and given a sufficient exposure to such high intensity noise a noise induced hearing loss may result over a period of time

In summary an attempt has been made to describe the localized effects of the decompression syndrome on the contents of the temporal bone With the increase in diving as a sport and the great commercial interest in underwater activity more and more cases of aural problems associated with diving are seen by the practising clinician

The Royal Navy the US Navy and many civilian centres continue actively to research the problem in order to promote safer activity

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Non Odontogenic Soft Tissue Cysts of the Oral Cavity

T. J. C. Hall

ABSTRACT

The aetiology and clinical features of five types of non odontogenic soft tissue cyst of the oral cavity are described and case reports presented

Introduction

Several classifications have been proposed for cysts of the jaws and oral cavity based on either the aetiology or the clinical or histological features of the lesion[1,2,4,5,6]. The cases described in this article are not confined to any one section of such a classification nor do they include examples of all the types of cyst that may be encountered but they are presented to show the typical features and management of some of the non odontogenic soft tissue cysts and cyst like lesions frequently seen around the mouth.

Nasolabial Cysts

These uncommon cysts lie in the soft tissue beneath the ala of the nose and arise from remnants of embryological epithelium at the junction of the globular lateral nasal and maxillary processes. Rood Petersen[6] reviewed 116 cases and noted that there was a 3.5 : 1 predominance of female patients in the series and that bilateral cysts were present in 11.2 per cent of the cases. The nasolabial cyst produces a palpable swelling under the lateral aspect of the upper lip which raises the ala cartilage and obliterates the nasal fold. As it lies within the soft tissues the only radiographic sign that may be seen is due to the distortion of the inferior margin of the nasal aperture which may produce a characteristic posterior concavity shadow of this structure on the [illegible] occlusal radiograph[7].

Case Report

A female patient aged 69 years presented with a history of a swelling under the left side of her nose. Examination revealed a cystic swelling in the soft tissues beside the nostril and above the reflection of the labial sulcus lateral to the ala. The patient had been edentulous for several years and no radiographic abnormalities were detected. A tentative diagnosis of nasolabial cyst was made and the area was explored under general anaesthesia. An incision was made in the mucosa over the swelling and this allowed a 2 cm diameter cyst to be enucleated by supraperiosteal blunt dissection (fig. 1). The cyst capsule was continuous with the nasal mucosa at one

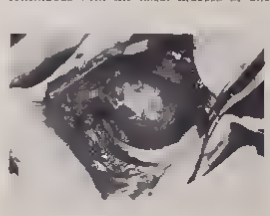

Fig. 1 [illegible]

[illegible] and a perforation occurred during dissection which was closed with catgut prior to closure of the oral mucosa The histological report confirmed a cyst lined by pseudo stratified columnar epithelium with goblet and ciliated cells

Mucosal Cysts of the Maxillary Sinus

These comparatively common cysts of uncertain aetiology usually arise from the lining on the floor of the maxillary sinus and present as symptomless solitary round or dome shaped opacities on radiographic examination (fig 2) They lack a bony perimeter and may spontaneously prolapse into the nasal cavity or as in the following case through an oro antral fistula into the mouth Mucosal cysts should be differentiated from antral polyps of an infective or allergic origin which are frequently seen in association with a thickened antral mucosa. These cysts are lined by a thin layer of oedematous connective tissue with cholesterol crystals in the walls and their antral aspect is covered by normal respiratory epithelium [2]

Fig 2 Radiograph showing [illegible] cyst of the [illegible]

Case Report

A male naval rating aged 31 years was referred by a general dental practitioner who had removed an upper first molar for pain a week earlier while the patient was on leave The practitioner noticed a dark mass of tissue in the socket following the simple removal of the tooth and by the time the patient was seen on referral this had partially prolapsed into the oral cavity The patient was symptom free and had not noticed any passage of fluids between the mouth and the antrum at this stage There was no expansion of the alveolus or lateral wall of the maxilla and the remaining teeth responded to vitality tests Radiographs showed an ovoid shadow in the lower part of the antrum above the socket and aspiration produced a thin straw coloured fluid which formed a gelatinous clot when left to stand

A flap of buccal mucosa and mucoperiosteum was raised under general anaesthesia and sufficient bone was removed above the tooth socket to allow access to the cyst which ruptured easily when enucleation was attempted The thin cyst capsule was removed and the flap was advanced to obtain an edge to edge closure with the palatal mucoperiosteum Post operative recovery was marred by a partial breakdown of the repair and subsequently a further buccal flap was required with an intranasal antrostomy to close the fistula This cyst was removed primarily because of the oro antral fistula which was present and secondarily to confirm the diagnosis and exclude a residual dental cyst or more serious pathology Symptomless mucosal cysts do not necessarily require removal

Dermoid Cysts of the Floor of Mouth

Sublingual dermoid cysts are considered to arise from epithelial remnants along the lines of fusion of the mandibular arch components of the anterior two thirds of the tongue median and lateral varieties may occur [3] These cysts typically present in the adult as slowly growing swellings below the tongue They may reach a considerable size and be visible below the chin when the mouth is closed When the mouth is opened however the contraction of the sublingual musculature raises the cyst into the mouth. Histologically three varieties of cyst may be

recognised firstly the epidermoid type which is lined by stratified squamous epithelium and contains keratin secondly the dermoid type which is lined by palisading squamous epithelium with hair follicles and sebaceous glands and thirdly the teratoid type which in addition contains connective tissue elements and other forms of epithelial tissue [1]

Case Report

A WRNS rating aged 19 years was referred with a two year history of swelling below her tongue It was not painful and she had not previously sought advice Examination disclosed a large firm yellowish sublingual swelling just below the oral mucosa in the midline posterior to the anterior region of the mandible (fig 3) which was also visible extraorally as a "double chin when the mouth was closed (fig 4) The cyst appeared to lie above the mylohyoid muscle and salivary gland functions were unimpaired An incision was made under general anaesthesia from the tip of the tongue along the edge of the fraenum to the lingual mucosa between the central incisor teeth The cyst was found to have passed posteriorly between the genohyoid muscles towards the epiglottis but careful blunt dissection around the periphery enabled it to be removed (fig 5) The wound was closed by interrupted sutures with vacuum drainage The cyst measured 7 x 6 x 5 cm and the

Fig 4 Frontal profile showing swelling below tongue

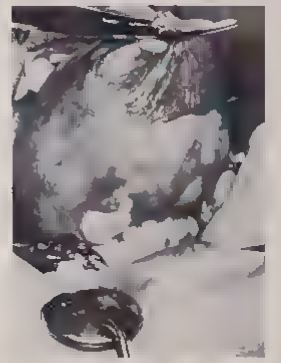

Fig 5 Dissected cyst with tongue reflected

Fig 3 Sublingual swelling

lining was reported as being of the epidermoid type lined by stratified squamous epithelium These cysts do not usually recur but Blenkinsopp and Rowe[11] have described a similar cyst that recurred 13 years after removal which they attributed to the seeding of a daughter cyst through a vascular perforation in the mylohyoid muscle

Mucous Retention Cysts of Lip

These common lesions are not true cysts as they do not have an epithelial lining and they are better described as mucoceles or extravasation cysts The great majority present as painless bluish swellings on the inner aspect of the lower lip They are considered to arise from damage to or rupture of the duct of a minor salivary gland which has allowed mucus to escape and pool in the tissues The mucus stimulates the formation of granulation tissue which forms the non epithelial lining[12] Mucoceles increase in size and frequently discharge spontaneously however they nearly always recur unless the causative minor salivary gland is removed

Case Report

A male naval officer aged 20 years presented with a 1 5 cm diameter soft superficial fluctuant swelling on the inner aspect of the lower lip (fig 6) It had increased in size slowly over the previous month The mucosa was incised over the cyst under local anaesthesia and the mucus was evacuated and all the minor salivary glands in the vicinity were removed before closure Recovery was uneventful without recurrence.

Ranulas

The ranula is a relatively unusual transparent bluish swelling in the floor of the mouth beneath the tongue to one side of the midline It is soft fluctuant and painless and covered by thin normal mucosa in which the stretched blood vessels may be prominent The aetiology is similar to that of a mucocele namely the pooling of mucus in the tissues derived in the case of the ranula from a sublingual salivary gland If a posterior sublingual gland is involved the ranula may plunge posteriorly and inferiorly into the neck

Case Report

A nine year old girl presented with a two week history of a painless sublingual swelling which was raising her tongue and interfering with eating The swelling was incised as a temporary measure under local anaesthesia and a large quantity of mucus was released However four days later it was obviously reforming and contained further mucus by then mixed with blood (fig

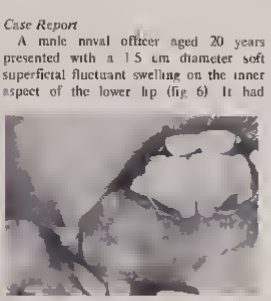

Fig 6 Mucocele of lower lip

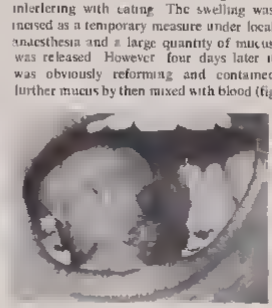

Fig 7 Ranula

7) The associated sublingual salivary gland was therefore removed under general anaesthesia via an incision in the floor of mouth mucosa parallel and lateral to the submandibular duct. The gland was separated from the mylohyoid muscle and care taken to avoid damage to the lingual nerve. Recovery was uneventful and the cyst has not recurred.

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Marine Biological Sewage Treatment Plants

J E Morris and J R Elgie

ABSTRACT

The principles and advantages and disadvantages of marine biological sewage treatment plant are discussed with respect to the Inter-governmental Maritime Consultative Organisation (IMCO) Regulations on the disposal of waste in controlled waters. It is concluded that the operating difficulties outweigh the advantages of this type of plant for naval

Introduction

Because of the problems posed by the pollution of coastal and inland waters some states now ban the discharge of untreated sewage from ships This has led to the development of various types of shipboard sewage treatment plans and to much debate on the standards to be applied to the effluent from these plants

At a conference held in London in 1973 attended by 79 states IMCO approved a convention for the prevention of pollution from ships which included in its provisos that ships would not be permitted to discharge sewage within four miles of land unless they had in operation an approved treatment plant Between four and twelve miles from land sewage must be comminuted and disinfected before discharge The 1973 Convention was supposed to enter into force twelve months after being ratified by fifteen states which registered between them at least 50 per cent of the world's merchant shipping and it would then form part of the Law of the Sea Because of the difficulties in formulating effluent standards and guidelines for performances tests on treatment plants progress towards ratifying these proposals has been slow Nevertheless some states now require visiting ships to provide a certificate of performance of the installed sewage treatment plant and insist on limitations with regard to such measurements as Biochemical Oxygen Demand (BOD) chlorine nitrates and faecal bacterial count

Long before the 1973 conference however the Ministry of Defence (Navy) were aware of the problems of sewage disposal from ships in harbours and basins One of the most unpopular aspects of life on board a ship alongside or in dock has been the visit to a dockside head (perhaps on a freezing dark January morning) and by the 1960s there had been some experiments with on board holding or treatment tanks especially in Admiralty Floating Docks and accommodation ships By the 1970s it was thought that biological treatment offered the best solution for ships of the Royal Navy and plants based on the operating principles of the BIOGEST[1] system manufactured by Peters of Slough began to make their appearance Some 30 plants of this type have now been installed in different classes of ship Some have apparently worked successfully for short periods but on the evidence of the results obtained from samples assayed in this laboratory most have not It seems doubtful whether they could satisfy the criteria of the IMCO proposals contained in Recommendation on Effluent Standards and Guidelines for Performance Tests for Sewage Treatment Plants[2] published in

1977

The purpose of this paper is to re examine the principle of the biological sewage treatment plant and to question whether it is the most suitable type for naval purposes.

Operating Principle

A flow through diagram of the process is shown in figure 1 Sewage is delivered to the aeration compartment where the biolysis of faecal matter is achieved by micro-organisms in the presence of oxygen delivered by air diffusers The aerated mixed liquor is transferred by an air lift pump into the settlement hopper where the activated sludge settles out and falls to the bottom of the tank The processes which transform raw sewage are complex and not completly understood despite 60 years of research They are discussed in more detail below and in a properly operating plant should result in a floc which to the naked eye is a light brown precipitate that rapidly settles in its mother liquor leaving a clear colourless sparkling odourless super natant liquid

Periodically a second air lift returns some of the activated sludge from the settlement hopper to the aeration chamber and this helps to maintain the total solids and accelerates biolysis The liquid effluent flows into the collection chamber where it is diluted with water from wash basins showers and galleys before being pumped to the chlorine treatment plant Chlorine dosage is metered automatically and after a suitable contact period the disinfected clear effluent is discharged overboard

The advantages of the system are that when working properly it produces a clear non-putrescible effluent in which about 90 per cent of the bacteria are removed there

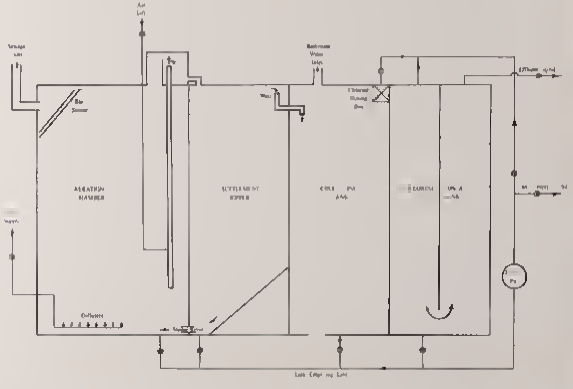

Fig 1

are no odours during operation, ship motion is unlikely to affect plant performance and the degree of nitrification is controllable. The latter is important because under certain conditions occurring in the body of water receiving effluent the nitrates stimulate algal growth. One further advantage of this operating principle ashore is the commercial value of good quality activated sludge. The disadvantages of using the principle in naval plants are discussed later.

Decomposition of Sewage

Untreated sewage left in a tank decomposes anaerobically. A microscopic examination of fresh sewage shows the presence of numerous bacilli, cocci and filamentuous bacteria ranging between 2 and 20x10⁶/ml. Fungi, algae, protozoa, metazoa, vermes and arthropoda are not ordinarily present except as spores, cysts or larvae. When sewage is very fresh it contains some oxygen which rapidly disappears as urea and ammonia are partially oxidised. As the sewage becomes anaerobic putrefaction sets in and bacterial enzymes are produced which break down proteins to form urea and ammonia, foul smelling mercaptans, hydrogen sulphide and fatty and aromatic hydrocarbons. Carbohydrates are broken down to form the original fatty acid, water, carbon dioxide and methane. Fats and soaps are affected somewhat similarly to the hydrocarbons but the bacterial action is slower and the result is that in the anaerobic stage of decomposition a black sediment will appear, a greasy scum rise to the surface and offensive odours are given off. This condition may persist for several weeks but eventually passes into the third stage which is the oxidation or nitrification of the products resulting from the putrefactive state to form nitrites or nitrates. These latter are in a stable condition and are available as plant food.

The Aeration Process

The actual discovery and recognition of activated sludge is generally credited to Lockett[2] but the process has been extensively studied and many theories put forward to explain the phenomena that occur. These have included electrostatically charged colloids, bioprecipitation, bacterial enzymatic action, clarification by protozoa and base exchange. The changes in the aeration tank occur in two main stages (1) flocculation and clarification and (2) nitrification. The former takes place within the first hour of aeration, the latter starts towards the end of that period and tapers off slowly, sometimes taking as long as three weeks. Nitrification is dramatically shortened however if activated sludge is added and although the total aeration period varies between three and eighteen hours in different plants (depending to some extent on the strength of the raw sewage in terms of its BOD) a well designed plant with optimum oxygen supply should achieve 60 per cent purification within the first hour.

It was formerly thought that the biolysis of sewage was mainly brought about by bacterial enzymes but it later become apparent that the major difference between putrefacted and aerated sludge was the presence in the latter of protozoa and other higher forms of life. In a series of papers[3,4,5,6,7] quoted in Sridhar and Pillai[6] Pillai showed that it was only when *Vorticellid* protozoa were present in large numbers that a flocculent sludge was formed and that effluents became clear. In Notes on Water Pollution[9] it was concluded from experiments conducted in laboratory scale plants that protozoa play a definite and useful part in the activated sludge process. In their absence the plants produced very turbid effluent containing large numbers of bacteria which were reduced by an inoculum of ciliated protozoa including *Opercularia*. Curds and Fey[10]

confirmed that protozoa play the dominant part in the removal of *Escherichia coli* from sewage and Mishoe[11] emphasised the relative importance of bacteria and protozoa in the purification process and stressed the importance of an adequate supply of oxygen. A generally accepted figure for dissolved oxygen in the effluent is 1 mg/litre and Mishoe found that when the air diffusion rate was reduced from 150 to 55 m^3 per kg BOD the values for effluent dissolved oxygen fell to 0·1 mg/l or less. (Sewage varies in its BOD but 1 kg BOD is the approximate requirement of 1000 litres or 220 gallons of raw sewage). The secondary effluent soon resembles the primary effluent under these conditions and stale odours are generated. Microscopic examination of the sludge shows only bacteria and no protozoa. When the air diffusion rate is increased once more the effluent becomes sparkingly clear and abundant rotifers and *Vorticella* are apparent.

In a series of experiments in which they studied the enzymes catalase, protease, urease and phosphotase in raw sewage, activated sludge and septic tank sludge to assess the relative importance of bacteria and protozoa, Sridhar and Pillai[8] showed that the initial decomposition of fresh organic matter is almost entirely due to bacterial activity but the later oxidative changes and removal of suspended solids is largely due to protozoa such as *Epistylis articulata*. They stressed that even under intensely aerobic conditions bacteria with large amounts of catalase activity had only a limited ability to flocculate and oxidise organic matter.

It is clear then that the biological processes taking place in the aeration tank are complex and delicately balanced. They are likely to be affected by changes in the BOD of raw sewage (which in turn is related to quantity) by the type of flushing water (fresh or sea) by temperature and pH by the quantity of oxygen diffused and by the relative numbers and types of bacteria and protozoa present at different intervals. In a small plant toilet cleaners having biocidal or biostatic properties are likely to interfere with the process if delivered in sufficient concentration and their effects must be tested in a simulated plant *using sea water* before being accepted for naval use. An added difficulty is that many of these agents may have symbiotic or antagonistic biocidal properties.

Sewage Treatment Plants in HM Ships

Samples from the plants fitted in survey ships and in Type 22 and Type 42 ships have been analysed in this laboratory during the past ten years. Most authorities are concerned only with the quality of the effluent and routine tests have included pH, suspended solids, faecal coliform count, residual chlorine and five day Biochemical Oxygen Demand (BOD_5) on spot samples collected by Fleet Health Inspectors. Sometimes it has been possible to obtain serial samples over a few days but this is difficult to arrange in an operational ship. At the requests of Naval Medical Officers of Health, Director General Ships and Principal Naval Overseers various research studies have included floc tests and other investigations on aeration chambers.

There is little point in a rigorous analysis of this data because it is evident that there have been many operating difficulties and some plants are being used essentially as 'hold and flow through' facilities for raw sewage. It is apparent from the results of floc tests and the comments of Fleet Health Inspectors on the appearance of the aeration chambers and the odours emanating from the plants that some of them have been in an anaerobic condition. Some plants apparently work for short periods but many operators maintain that this was only because they fed substances to the aeration tank. A folk-lore seems to have

sprung up which insists that the plants work if dried milk is added to the aeration chamber! This could help in bacterial multiplication but as has been indicated above would not necessarily increase the rate of oxidation and nitrification. Some operators report the use of large quantities of chlorine in order to clear the effluent. This not only risks the discharge of excess chlorine to sea but should not be necessary if the plants are working properly and if 90 per cent of the bacteria is destroyed before the chlorine contact tank.

Over half the samples analysed would fail the limits for effluent quality proposed by IMCO. There are moreover preconditions to the IMCO testing procedures which it has not been possible to implement. In summary, these concern:

1. The standardisation of the influent under normal operational loadings and flush waters for the period of the tests.
2. Duration of tests, namely ten days after steady state conditions are achieved.
3. Sampling frequency. A minimum of 40 effluent samples is suggested in order to determine the geometric means and variance for the control parameters. There are also proposals for the recording of other parameters which some governments have asked to be included.
4. The use and nature of any disinfectants.

Under the defined conditions for testing the IMCO effluent standards are:

1. The geometric mean of the faecal coliform count of the samples collected should not exceed 250 coliforms per 100 ml as determined by standard testing procedures.
2. The geometric mean of total suspended solids should not be more than 100 mg/l above the suspended solids content of the ambient water used for flushing purposes when tested in accordance with approved procedures.
3. The plant should be designed so that the geometric mean of BOD_5 of the samples collected does not exceed 50 mg/l.
4. If chlorine is used as a disinfectant the residual should not exceed 5 mg/l as free available chlorine.

The other suggested parameters to be recorded include differentiated solids, chemical oxygen demand, turbidity, nitrates, phosphorus, carbon, total coliforms and streptococcal count.

It is therefore essential that when a particular type of plant has been certificated as complying with the IMCO requirements by the Board of Trade it should be capable of running to the required standards with the minimum of skilled attention or control tests. The major disadvantages of continuing with plants based on the biological principle for naval purposes include the uncertainty of the results to be expected under all conditions and the necessity for constant and skilled attendance. The feasibility of laboratory control tests required for this type of plant has been discussed at length but on buard tests do not appear to be practical at the present time. Bacterial counts, for example, are out of the question and BOD_5 presents problems.

It is concluded that biological sewage treatment plants are unsuitable for use in Royal Navy ships for the foreseeable future and experiments are being conducted on systems employing physico chemical principles.

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BOOK REVIEW

ANOREXIA NERVOSA — LET ME BE A H Crisp Pp 200 London Academic Press Inc (London) Ltd 1980 £8 60

This is a compact book of some 200 pages based on the author's 20 years of experience of this difficult field The book initially reviews anorexia nervosa as an illness filling up the background to the disorder its mechanisms and processes This builds up a conceptual model of this complex disorder The section on the mechanisms and process of anorexia nervosa is particularly helpful in the new student of the disorder dealing with the behavioural and physical features of the condition in particular the concept of anorexia nervosa as an adaptive process is of help in understanding the evolution and persistence of the difficulty

The latter part of the book deals with the making of the diagnosis and the attempts to treat treatment The needs and the rights of the patient are discussed as well as self help techniques This section ends with a number of accounts of the problem as seen by the patient and relatives

This book is a very useful introduction for the general practitioner and the newcomer to the treatment of the anorexic patient It adopts a commonsense approach and the language is easily understood by the non specialised medical reader For the specialised doctor already involved in the care of anorexia nervosa it provides a very helpful bibliography

AWSB

MEMORABILIA

Still the Hands of Memory Weave — Dick Caldwell writes.

I re id and enjoyed as I am sure did many others Dudley Gurd s interesting and pleasing evocation of life in the batch away back in those carefree days of 1934

Perhaps a further dip into the rag bag of memories would amuse or amaze certainly some of your younger readers

Like Dudley my announcement to my family that I contemplated a spell in the Navy was not greeted with unalloyed enthusiasm but I do remember that the advent of an OHMS letter telling me I was accepted and addressed for all to see to Surgeon Lieutenant E D Caldwell Royal Navy gave me immediately a fantasy of n new found status as a rather swashbuckling sea dog and a cog albeit not a large one in the affairs of state

I was nt the time greatly attracted by the opportunities for travel — the Mediter ranean and all its ports the West Indies the East Indies the Persian Gulf China, Africa India Ceylon Bermuda all conjured up new and exciting possibilities and I think this factor which does not obtain nowadays was of paramount interest to all of us Haslar proved to be an enlightening and entertaining four month period and the quality of life — through the rose-coloured glasses of days long past — was memorable in many ways It was certainly not such an intensively competitive and materialistic world as it is today Our batch comprised three Scotsmen three English two Irish a voluble Welshman and an uncharacteristi cally serious New Zealander whom I princi pally remember as rather morosely comparing our weather unfavourably with that of the Antipodes

As Dudley remembers we were primarily nursed helped gently led or pushed into a degree of acceptability for the Navy by Bob Pauckridge whose extra half stripe gave him in our eyes an Olympian authority which he discharged with much panache and success and though on occasions our non military appearance and our civilian gaffes must have both amused and irritated him he steered us through these twin pillars of Hercules and many other waters with unerring friendliness tact and firmness

We clustered together amicably and I suspect protectively absorbing by a process of slow osmosis navni lore and customs interspersed with lectures on tropical medi cine VD ship s health and a plethora of medical forms and documents It is perti nent and salutary to reflect that clinically in those days there were no sulphonamides no penicillin no antibiotics at all an ECG was a relative rarity and a blood drip was a fairly rare and dire emergency measure

After the first rather bewildering shock of seeing ourselves proceeding to Church rather self conscious in frock coats stiff white collars Wellington boots and white gloves we settled down quite quickly to a delightful existence Four of us bought n

secondhand Morris car for five pounds (25 shillings each) and we soon discovered the opportunities for every kind of sport we discovered the pubs and eating haunts in Portsmouth and we discovered the Assembly Rooms (a popular dance hall) in Southsea and already as to the manner born we were lightly interlarding our conversation with such esoteric phrases as a run ashore" "warming the bell "wet as a scrubber" "day on slop on" dropped it in the Oggie and most punctiliously did we salute anything that might be considered to be a quarter deck — or of course a senior officer

But to go back to the first evening in the Mess which remains fresh in my memory In those days gin was rarely drunk in Scotland and it at all almost entirely by women In Edinburgh certainly gin as a drink had a distinctly effeminate connotation What was my surprise or even horror therefore, to find a bevy of definitely male and hearty naval officers brazenly consuming this suspect beverage However what was good enough for our seniors and betters was good enough for us and pink gins circulated happily We were soon told that in the Navy one never asks a fellow officer to "have another drink" but must invariably say have the other half — we accepted this arithmetical anomaly without question

Senior officers were as Dudley Gurd remarks much more remote and though in the main charming and delightful to us when the occasion arose one harbours an early picture of the ten of us — slightly nasnra neophytes as we were standing together at the far end of the Wardroom waiting to be noticed and clearly determined to do the right thing whatever the right thing might be Surgeon Commanders appeared to us in those early days to be slightly elderly semi deities and Surgeon Captains and above layered off into the stratosphere None of us in the batch of ten was married and on completion of our training we were all posted abroad for two years or more which highlights the social changes obtaining today

One night after some prestigious function in the Mess I was making my way to my cabin (not bedroom you notice) when I passed another cabin with its door wide apen glancing in I was not a little astonished to see one of our Surgeon Captains clad only in a shirt and patent half Wellingtons this was almost *lèse majesté* I averted my eyes "Caldwell isn't it?" he shouted I returned wondering what solecism I had committed He looked at me with a compelling eye "Pull off these bloody boots there's a good chap he said I wrestled and tugged them off his hot feet one by one (this can be an exhausting exercise as many of you will know) "Thanks Cornwall" he said I retired to my bed hot head achey but happy something attempted something done had earned a night s repose

Although it did not happen during our batch days it was shortly afterwards and I was present when a Surgeon Commander of notoriously short temper — particularly at breakfast — came into the dining room one morning and ostentatiously hung from the chandelier a home-made but explicit notice with SILENCE written on it My memory is clear that apart from a gently whispered "pass the marmalade" or similar overriding necessities this rather Draconian injunction was observed punctiliously

Finally Dudley mentions the two shilling a night hostel in Queen Street Portsmouth I freely admit that I and three others in the batch used this accommodation not infrequently when we had missed the last ferry from Portsmouth Harbour to Gosport and we did sign in as Mr So-and So (the names invariably being those of very senior officers) For some reason this little piece of juvenile delinquency caused us immense amusement but it had a further dividend At the police gate at Haslar there was a

book which any Surgeon Lieutenant coming in after midnight was obliged to sign This book was carried to the SRA s office at 0800 each morning and it was our naive belief that a too frequent appearance of one's name showed evidence of an over-enthusiastic attitude to the bright lights and might seriously block one's chances of promotion to Surgeon Lieutenant Commander! We soon realised however that if you marched through the gates after 8 am there was no book and thereby no name to sign only a cheerful morning salute from the unsuspecting forenoon watch policeman

If I appear over critical or too flippant it in no way indicates a lack of respect for or pride in the Service They were great days happy days and I developed an affection for the Navy and Haslar in particular (the bench overlooking the Solent on which I proposed to my wife in 1942 is still there) and all these things have I suppose prompted these nostalgic ramblings and have also enriched and sustained my thoughts through the vastly changed and turbulent post war years

Our Naval Medical Service despite all the difficulties has grown and developed in clinical and academic stature and has a tradition and a reputation that all who have served in it can be proud of and can cherish

THE ROYAL NAVY IN HONG KONG 1841-1980
Kathleen Hatland MA Published by the Royal Navy Hong Kong HMS Tamar BFPO 1

For those of us who have known Hong Kong and perhaps some who have sadly missed that experience this is a fascinating booklet written by the wife of the present Base Medical Officer HMS *Tamar* Much research was required since surprisingly our naval forebears left few official records of their activities that is quote CAPIC Hong Kong this short history fills a gap in recorded naval annals A chapter on Health gives a comprehensive account of the development of the Naval Medical Services in the Colony

Although not on sale a limited number of copies are available on application to Miss Hatland 10 Sherwill Lane Kelsonough Plymouth PL6 7DH (enclosing £1 to cover postage)

Editor

THE ROYAL NAVY MEDICAL CLUB DINNER 1980

The annual dinner of the Royal Navy Medical Club was held in the Painted Hall, Royal Naval College Greenwich on Friday September 19 1980

The President, Surgeon Vice Admiral J. A. B. Harrison, QHP, FRCR, delivered the following speech

Second Sea Lord Admiral President of the College Lords Ladies and Gentlemen My first task tonight is to welcome our guests — our official guests and the personal guests of members of the Club I welcome you all to this historic hall

Our principal guest tonight is Admiral Sir Desmond Cassidi Chief of Naval Personnel and Second Sea Lord Like all members of the Admiralty Board in recent years he has wide naval experience and considerable experience in many varied Flag appointments As the Board's watchdog on personnel which includes being our boss he exhibits all those qualities of leadership management call it what you will, we have come to expect — and accept — in the Navy and his drive and energy is mollified by humour If I may say so he is a well trained watchdog with the reputation of a fierce bark and a sharp bite but if one survives his incisive and decisive appraisal one needs to watch out for the thump of his wagging tail After six months I m wondering which will come first the bite or the thump! It is a pleasure to have him with us tonight — particularly as tonight he sings for his supper

As official guests I welcome my fellow Directors of the brown and light blue medical services and their Directors of Dental Services And Sir Henry Yellowlees Chief Medical Officer to the Department of Health and Social Security and the Chief Dental Officer both of whom dispose resources which dwarf ours but are for a different and more static task

Lieutenant General Sir Richard Bradshaw and Air Marshal Sir Charles Soutar are both in their fourth year of office Their resilience gives me heart as I start my stint I think we all believe that charity begins at home but as you know our Directorates are now in one building — and any leftovers pass amicably between the floors Though obviously it s harder uphill than downhill and we are on the top floor The pass to our building suggests that somewhere in MOD lurks an intelligent humourist Our pass has on it three balls — red balls In the present economic climate this may suggest the pawnbrokers rather than three directorates although the optimist may feel that it suggests the evolution of Superman

It is a particular pleasure to welcome here tonight Lord Richardson who is representing his successor as President of the General Medical Council As you will know he has retired from all his high offices To have him here enables me to express my personal thanks and the thanks of the RN Medical Service to him for his efforts on behalf of all Medical Services as Chairman of the Armed Forces Medical Advisory Board and as President of the Council of Postgradnate

Medical Education Like all really effective people he leaves not a vacuum but remembered achievements and a worthy successor We wish John Richardson a long and happy retirement

It is a pleasure to welcome here tonight Lord Smith on his appointment as Chairman of the Armed Forces Medical Advisory Board

We welcome the Presidents of the senior Royal Colleges — Professor Sir Douglas Black and Sir Alan Parks I regret my own College is not represented I do not think I have been blackballed as they have a weekend meeting in Bath and indeed it is one of the few such meetings I have missed myself in recent years I was sorely tempted to go and follow the precedent of a previous MDG who recently died and nominate a really good speaker to give this speech to entertain you

It is a pleasure to have the new Admiral President with us as he starts his stint Particularly as it reminds me of our happy association when John Carfill worked for Sir David Williams and I for Sir James Watt — who tonight leaves to lecture in Canada Sir David incidentally fired the first warning shots to us in this hall of the Navy s demands from us for economy From memory I summarise his sentiments as cut out the fancy waistcoats or I ll take your reelers

The Medical Service is always on the browsing line for economies Perhaps it distracts attention from more luscious fruits higher up the MOD tree? But like the old oak in parkland our branches and our functions are widely spread The nibbles are annoying but have so far done no serious damage I hope to keep it so while the nibbling continues and is repeated even on branches already trimmed

I welcome Colonel Watts who represents the BMA as Chairman of its Pay Review Body which resists some of those nibbles As an ex parachute medical officer he spans all the elements

In recent years this speech by MDG(N) as president of the Club has followed no set pattern Last year s speeches and entertaining speeches they were were both published in the Journal of the Royal Naval Medical Service to which I hope you subscribe — and if you don t please do as we need your support Those speeches make sad reading today only one year later It is a matter of regret that I have to report that some of the hopes expressed and even some of the achievements have not yet been realised — particularly the extension of professional service to 60 for Surgeon Captains which remains a vital policy objective It would encourage in my view conversions to Full Career Commissions and obviously improve retention

In view of this permanence of the recorded word I have given some thought to what I have to say to you — most of it during protracted delays during the play at Lords And what better advice can MDG base

never take your eye off the ball or stop thinking where it is going or where you want to send it

Of course the difficulty but in a job like this is to get it there Preferably for six but at least for a four But any MDG needs to remember that many of the games played in the MOD are certainly not cricket Snakes and ladders with loose minutes instead of a dice shaker would be a better analogy

I share my immediate predecessor s view that policy statements after dinner seldom stimulate the mind and often interfere with the digestion But six months after retiring onto the nails in the chair of MDG isn't a bad time for taking stock in the sense of defining where you want to send the ball — if one can overcome the Ministry of Defence bowling Most of it is the same old fashioned googly stuff but for all that no less potentially lethal particularly now

What then are the priorities for the Naval Medical Service for the 1980s and beyond?

We must maintain our long term objectives of increasing our professionalism in our care and cure services for the navy We must maintain and extend our good preventive medical services in which historically the Services have been leaders The new dimensions to which we should deploy greater efforts are in the areas which increase and promote personnel effectiveness now so important in controlling modern complex weaponry in the varied environments in which the Navy now operates And we should increase our efforts to develop the medical skills and knowledge which will be required in any possible conflict and particularly in the new dimensions of trauma of nuclear biological and chemical injury In a future conflict the expertise in these areas may have to be provided from within the Services Medical Services

In any military operation casualties should be minimised but some have to be accepted In maintaining the essential go-go morale of Service personnel whether in attack or defence in peace or in war Service Medical Services have a vital role to play Within the balance of overall priorities we need to take a greater medical interest in the positive promotion of physical and mental health and the proper use of exercise diet and leisure while discouraging the misuse of alcohol and tobacco and perhaps other substances in common use But with limited resources an intelligent balance needs to be maintained in all these tasks.

During the last year the real tasks of the Naval Medical Service — and certainly its operational medical deployments — have, as usual been met despite considerable personnel overstretch and the continuing and serious shortage of medical officers To overcome the latter is my primary task since without more people — particularly medical officers — we cannot meet the objectives I have outlined Though these objectives are not yet totally accepted I am sure they are important

Ideas for recruiting and even for retention are simple to produce results is more difficult and I think fundamental changes in conditions of service are necessary in the Naval Medical Service to overcome a problem which has been with us for at least a decade Characteristically we have been tasked to produce a study for Second Sea Lord by Christmas Meanwhile individual efforts can make a start I can report that five well motivated professional medical officers have taken on trust a belief in a good professional future and transferred to a full career commission in the last six months Nearly one a month isn't too bad because that is how I look at it — month by month And although it's nice to score in fours or sixes ones still count

I tell you this because I believe you here in this hall could help to send us recruits. Our primary need is for direct entry medical officers to overcome the shortfall The cadet scheme goes well and indeed its success will create its own problems in future unless the present shortfall is overcome by recruitment of qualified doctors and the retention of those we have.

In this context of retention four Surgeon Captains have expressed the wish to continue professional service to 60 accepting that there is no possibility of further promotion Their applications have not yet been approved and indeed in one case decision has been postponed for two years Only one Surgeon Captain has applied for early retirement in the last six months

I m sure we can offer satisfactory professional careers to those who become motivated to the Navy and we can and do give good general professional training and higher professional training to those who help with the task while training, and perhaps then leave us to remain friends of the Service in other medical fields of activity And some of course return to enjoy this evening with those of us who remain and some help us with recalls to

duty

I cannot tell you what particular sort of doctor we need in the Service because we require most specialties and can offer some facets of professional work not available elsewhere I can tell you — short as we are — the sort of chap we don't want — and will not take We don't want any of Spike Milligan's men! So aptly described in his doggerel

The wiggly waggly men they don't get up till ten
They run about and give a shout and go back to bed again.

In addition to our vital structural study, we have carried out a limited reorganisation of the Medical Department to meet enforced staff cuts Two other studies are in hand one potentially useful, and one fraught with perils beyond the browsing line of economies

In May I directed the Dean of Naval Medicine Surgeon Rear Admiral Roger Lambert, to undertake a study to assess our needs and the Navy's requirements for Consultants and GP principals and he will be reporting next month This requirement was last definitively assessed in the mid seventies When we will achieve what was recommended for us in the Jarrett Report in 1973 remains to be seen — and of course GP principals have appeared since then We envy the other Armed Services Medical Services their own more generous establishment and its acceptance

The study fraught with peril is forced on us by the Ministry of Defence in its search for economy but the Navy Department has at least ensured that we will ourselves identify the penalties that will accrue if economies on the proposed scale are enforced on naval hospitals in the United Kingdom Surgeon Rear Admiral John Haughton newly in office as the Surgeon Rear Admiral (Naval Hospitals) will lead this exercise His task will be to prove yet again the effectiveness of our two naval hospitals identify possible economies and ensure that all their tasks are essential and are economically effected I would remind you if reminder is necessary that naval hospitals not only provide care and cure district general hospital services but act as our training bases and deployment bases for our medical personnel Whatever the results of this study I am myself quite certain that the Naval Medical Service as we have come to know it since these hospitals were founded in the mid 18th century — incidentally for reasons of economy in the care of the sick — is not viable without them and at about their present size.

This is pretty serious stuff after a good dinner and clearly this imposed study conflicts with our long term objectives as I have defined them Its search for economy is directed at too narrow a target and moreover a target selected by those who do not comprehend the totality of the Medical Service contribution — or the interrelated nature of its functions and people In fact management cost economies are always possible — but we have neither the management structure to identify them or the authority to effect them on the basis of sensible proper priorities

As a relief it is always a pleasure to visit places where people are carrying out the real tasks I will select four visits — carried out, I hasten to add in view of my boss's stringencies for economy at minimal cost to the Crown

It was pleasant to inspect the training division in Haslar and to presenting their certificates and prizes to see their obvious enthusiasm and pleasure in achievement I know Second Sea Lord will be pleased to hear that I presented the first City & Guilds Certificate to a medical assistant under the new training scheme. Surgeon Captain Eric Mackay is to be congratulated on what he is achieving Our medical assistants are vital to our task and we need better paramedic training.

To visit Plymouth was a joy since

although 23 ont of my 33 years service has been in naval hospitals I haven t served in Sleepy Hollow' since 1951 The hospital hasn t lost the naval knack Old buildings staff shortages but good professional work carried out with *élan* and if I may say so in the traditions of Osler and Nightingale — and thank God having Inn in the true naval sense while doing it Both the Medical Officer in Charge now Surgeon Rear Admiral (Naval Hospitals) and the then Matron Miss Jean Robertson now serving as Deputy Matron in Chief in my department are to be congratulated on what they achieved I'm sure Surgeon Captain Jim Cox will maintain these standards.

All this sugary praise does not imply the denigration of Haslar and INM the former maintains its standards and INM in its new build goes from strength With the present travel restrictions all have the opportunity with the temporary curtailment of genuine peripheral tasks to get on with those that are static

Two other visits were to Germany and France In Germany I visited Wilhelmshaven Kiel and Hamburg and visited one modern busy professional German service hospital and a naval medical centre with impressive underground facilities I visited two research establishments with whom INM has close links In France I visited research establishments in Paris and Lyons and saw the new 465 bed service hospital in Paris — the Val de Grâce This hospital is ten storeys high but only five are above ground and it is built on the site of a service hospital rather older than Haslar It was started in 1975 and completed in 1979 One thinks of what we have *not* achieved at Haslar since 1970 Though the cross link has at last started It is hoped its facilities will justify the desecration it entails since it will still not achieve a modern hospital plan In France and Germany one can only envy the proportion of defence votes allocated to Service medical services and those Services medical plans and training for a future conflict

I suppose Brit Flair will win through in the end but I am beginning to wonder Clearly I m in danger of earning Churchill s warning to an irate Member of Parliament The Rt Hon member is in danger of generating more indignation than he can contain Maybe so but we must try to follow my boss s sensible advice Be businesslike be sensible and keep cool

I ve prattled on long enough but I cannot close without mentioning some members of the Club with us tonight particulary our Senior Civil Consultant Sir Francis Avery Jones and Mr Selwyn Taylor

It has been a great pleasure to have my old friend Surgeon Vice Admiral Sir Eric Bradbury with us tonight I ve known Admiral Bradbury well virtually throughout my service and incidentally enjoyed much of his magnificent hospitality Admiral Bradbury is a people chap and people I would remind you are our business Their ills their injuries their health and their effectiveness and our primary need is people to look after people Admiral Bradbury led us in the great days in Haslar in the sixties — a tradition which is sustained by the present Medical Officer in Charge Surgeon Captain Head

My Immediate predecessor Sir John Rawlins is with us tonight I expect he s enjoyed his dinner rather more than in recent years though I m not sure because he certainly has that naval knack of getting fun out of most tasks

I draw your attention to a unique feature of this dinner not achieved for some years We have with us six serving Surgeon Rear Admirals in uniform — although one is in a Tri-Service appointment and Frank O Kelly is regrettably on terminal leave. I m sure we all wish him well And Surgeon Rear Admiral George Binns the only man I know who sang his farewell speech and won a command revolver shoot as a Surgeon Rear

Admiral He still serves us well on the BMA Pay Committee And Surgeon Rear Admiral Hunter — the doyen of the dental officers for me I understand the problem of whether the whiskers are under or over the sheet at night is still unsolved

The RNVR are here as usual in strength and their assistance during the year is invaluable I don't know what the Army in Belize would have done without them let alone us I hasten to add. I don t say that in any spirit of criticism The Navy always supports the Army and the Naval Medical Service is happy to continue that tradition Surgeon Captain John Mead RNR is with us tonight for positively the last time in uniform John has done sterling work during his tenure as the RNR s medical tribal chief His successor Surgeon Captain Munro is with us tonight.

Enough is enough Since I have talked of our problems perhaps I may finish with a story of other people s problems

Oil prices and motor cars seem to be among our major worries I am reminded of a cartoon in Punch many years ago It showed a flat capped gent sitting in his large open Bentley obviously enjoying the throb of his magnificent engine In the background was a sweating attendant working the manual petrol pump grinding round the pump handle to Fill her up Underneath was written Switch her off Guv — she s gunning on me But as you know those old Bentleys were difficult cars to restart

It s taken me a long time to get to the point. Here it is My message is keep our professional Naval Medical Serice going — but keep an eye on the petrol gauge

I would like to thank the Mess Manager and the College staff on your behalf for an excellent dinner

If you feel the need to uplift your spirits before topping them up Surgeon Rear Admiral Philip Only will be playing the organ in the chapel after dinner

Members of the Club I ask you to rise and raise your glasses to our guests"

Admiral Sir Desmond Casswdy, KCB, Chief of Naval Personnel and Second Sea Lord replied on behalf of the guests

It is always a delight to have the opportunity to dine here in the Painted Hall so Mr President on behalf of all your guests I would like to thank the Royal Navy Medical Club for having given us that privilege and pleasure here tonight. We are all well aware that costs continue to rise and so in these straightened times it is fortunate that you have been able to maintain your annual event Moreover I must congratulate the College staff on maintaining such high standards and for the way in which they have risen to the occasion tonight Long may they continue to strive for the best

Although the Royal Navy Medical Club only came to Greenwich in 1953 most of us realise that Greenwich has been a place where sailors or ex sailors are cared for since 1694 and caring for sailors — or if you like all the people in the Royal Navy — is what you as doctors and dentists and I as Chief of Naval Personnel share together as our prime concern It seems to me that caring for people is not just an automatic or routine reaction to the immediate needs of the man who can then be put on one side and forgotten whilst the next case demands attention If we are to be caring people we must try to anticipate problems analyse effects plan contingency measures keep a balance within an overall programme and ultimately ensure by good communication that everything that is being done is fully understood by those concerned All of this is common to a Medical Service or any other well run organisation We try to do this in the personnel field the whole time but often outside events cause us to be reactive to them rather than positive in shaping policy in advance

The Service medical world is very exposed to outside influences both professionally through the Royal Colleges but also administratively in relation to the way in which the Health Service is run country wide. I am not here to comment on either aspect but only to say that it does not make it an easy job to organise and run an autonomous medical organisation But what I do want to emphasise is that, if our men are to be properly cared for during their time in the Royal Navy it is very firmly my opinion that in health terms this is best done by a Royal Naval Medical Service that fully reflects the needs of the Royal Navy in war and in peace and which itself understands those needs and can react and plan accordingly

I know well that I am preaching to the converted and that in the case of many distinguished retired officers here tonight there will be mutterings of blinding glimpse of the obvious or about time the Admiralty Board hoisted it in — well they have! But of course it isn't as simple as that and medical officers just like anyone else do not much like being taken for granted — and they should not be But misconceptions abound in some people's eyes our medical organisation is seen as being grossly expensive and far too grand for today's needs But how many of you have taken the trouble to get hold of commanding officers or other senior officers and really tried to explain to them why the basic ingredients of a hospital organisation must cover a wide spectrum of specialisations why it really does have to have professional excellence to retain those specialists why those specialists have to have all sorts of patients to exercise those skills why those patients have to have different sorts of wards and those wards must have nursing officers and nurses under training and if you have training schemes they must be supervised and administered And even more important you are here because you want to practise medicine in the *Royal Navy* as *naval* medical officers And so you go on and on and yes it does cost money So if it is all as clear cut as that why are we continually fussing about the size and shape and cost of the Naval Medical Service? For two reasons I suggest first you have *not* sold yourselves properly to explain what the minimum needs are and secondly, you may not have examined every facet of those needs yourselves and been critical enough in containing costs of material and manpower

You know as well as I do — and I have been involved in some of it — that there have been successive exercises to trim back — the exercises called for by the Admiralty Board in the mid seventies outside studies by Barraclough and Godber and others with successive looks at bed numbers All these suggest that the message has not got home and either we are unconvincing in our arguments or we have not got it right yet

I am sorry to say that the search for economy will continue — but in the end you must demonstrate the lean and professional shape which is needed to care for the essential needs of the Service If we cannot do that then other options will be examined yet again and that would be unfortunate to say the least It will therefore mean that we have a frustrating time ahead — and financial constraint will mean frustration in a lot of fields Amongst them is of course, the future works programme We may be proud of our long history but old hospitals are expensive and difficult to modernise — we will try and find money for the essentials and hope for sunnier times ahead Your forebearance is appreciated — in advance

Against that rather sombre background let me say that I very much appreciate the importance of having the Medical Director ate General (Naval) and the whole of the Naval Medical Service as part of my team Quite apart from the obvious fact that a fighting service must be a fit and healthy one I believe that good medical care can and does play a vital part in our retention

battle If our men and women have real confidence in the professionalism of the modern naval doctor and can see that treatment can be provided without any inordinate delay that problems and solutions will be clearly explained and discussed that wives or parents where necessary will get a sympathetic and understanding outline of any problem and after care is good then I believe that this generates confidence and helps us to influence our people in the benefits of continued service in the Royal Navy I know that you all believe this but I am bound to ask whether you — each and every one — have played your part in putting this across to divisional officers and senior ratings Because if our divisional system is going to work properly it must have the backing and support of everyone — each in his professional sphere — and most especially from the naval doctor I stretch this point even further to emphasise another blinding glimpse of the obvious which is that in their relationship with divisional officers and with the chain of command it is vital that each side brings problems to the notice of the other at an early stage I recognise that I might be skating on the thin ice of medical ethics and you must be the judge of that but I know that team work between the doctor and divisional officer in the area of personal worries work stress abuse of alcohol and even aspects of personal relationships can play a vital role in helping to solve problems in such cases Once again it comes back to generating confidence that both sides are caring about the best interests of the man

Quite rightly considerable thought and emphasis is now being put on the war role of the Naval Medical Service Clearly a service which is trained and ready to go into battle must have the means to care for its battle casualties and get them back into service in the shortest possible time (This is retention in its most obvious form!) I suspect that as the years pass since the last major conflict the realities of war have inevitably been increasingly forgotten in many areas of the Service I think it is absolutely right therefore that with our friends in the USN the Medical Service is making a conscious effort to retain and develop the special knowledge and techniques related to casualties in war Financial support will be needed for this project and times are very difficult but I can only say that I will do what I can I do believe however that it is vital that in times of peace we do not forget our war roles and very importantly the part which our reserves have to play in war

I am heartened too by the amount of work which is going on particularly in the Institute of Naval Medicine, to help produce better solutions — environmental equipment and medical — to improve the lot of our sailors — and aviators — in their daily lives Work goes on to investigate atmosphere control protective clothing, noise noxious gases in firefighting survival and a host of other areas All are related to the needs of the Service but few officers and men really know about it and as a result not many men come forward to help with trials — once again have you all played your part in explaining the importance of this work? And once again I suggest that it has a bearing on retention because no one wants to work in bad conditions with inadequate protection or in a dangerous environment

I do not apologise for taking this opportunity to make a speech sound a bit like a lecture! There is the other side of the coin too because perhaps we (the non doctors) take our doctors for granted far too much The Doc is always around in time of crisis or as a matter of routine it is assumed that he knows his stuff and so he is left to get on with it not all Commanding Officers or Executive Officers appreciate the enormous contribution which a good Medical Officer can make to a happy healthy and well disciplined organisation But if we take the

high standards of our Naval Medical Service for granted it will not be long before we find an element of disenchantment creeping in — I believe that it is necessary for us to take positive steps to keep the Medical Service in a fit and healthy state

This means keeping the skilled doctors we have, recruiting new ones, and evolving the organisation to meet today's and tomorrow's requirements and conditions. Again this is a matter for co-operation — between yourselves and the rest of my department. I will continue to try to get the conditions of service right — and one day this may include getting the MDG paid more than his Rear Admirals' — but recruiting is a matter for us all. I believe that personal contact can be very important here and, as a relatively small and specialist branch, you have some advantage over the rest of us. Good contacts with the medical schools and continuing personal liaison with medical cadets whilst at those schools do, I am sure, pay enormous dividends. I am aware that this already happens but can we all say that we are doing all possible? I imagine that there are many here tonight — guests and members now retired from the Service — who could help us in spreading the word, and I would ask them all if, when talking with and advising young doctors and students, they would bear in mind the possibility of a naval career for them. Recruiting and morale are in general good and we must not allow the — hopefully — temporary set-backs of current financial constraint to plunge us all back into the slough of despond. What impresses me when I leave the office and get out to visit ships and establishments is that, although we at HQ may sometimes feel a bit gloomy when bowed down by the weight of yet another funding problem, out in the Fleet and the Navy at large spirits are high and life goes on as cheerfully and purposefully as ever.

Not only have we much to be confident about — you in particular have much to be proud of. The Navy's help in providing medical cover in Rhodesia was much appreciated and the work of doctors and medical ratings in other areas where disaster has struck has often been commended. Frequently I hear of requests for our doctors to take leading parts in international conferences, seminars etc, and though regrettably I cannot always be generous with funds to support such applications, I am left in no doubt of the high regard in which RN medical expertise is held abroad.

For the future, I hope that work now in hand following earlier reports on Service hospitals will result in a streamlined and cost effective hospital service. But more importantly I hope that this can be achieved without disregard of the principles by which the Naval Medical Service would wish to run our hospitals. But the hard fact is that there will have to be economies, partly undoubtedly through inter Service co operation and rationalisation, and the extent to which these are successful will depend to a large degree on your own willing and progressive attitudes. Hospitals *are* expensive and unless we are prepared to go some way towards a rational organisation we may well have it imposed upon us and end up worse off than necessary. We must not be intransigent in our attitudes.

I have tried to tell you why I think the Navy needs its own special Medical Service and how this Service is highly regarded. I have suggested areas too where you can help yourselves but I am convinced as a member of the Admiralty Board, that we must continue to have our own independent medical branch which must strive to strike a balance between the needs of the Navy as a whole and the professional aspirations of its members. I am sure that with good planning and goodwill and by keeping our nerve and confidence through what will undoubtedly be a difficult few months we will achieve this.

BOOK REVIEWS

PRINCIPLES OF X-RAY DIAGNOSIS OF THE SKULL Second edition G H Du Boulay Pp 400 Sevenoaks Thn Butterworth Group £38 00

Thn first nd on was published in 1965 and quickly becamn thn standard text for students of radiology

Thn new edition has changed little and thn author's intention is still to teach thn basic principles of diagnosis by thn study of the plain radiograph

Thn author adopts thn traditional regional subdivision in describing the effects of disease on thn normal base and sella followed by a chapter on intracranial calcification. He presents the effects of disease in chapter headings and sub headings and normative conditions and diseases. The emphasis throughout between chapters prevents repetition. Radiology of thn useful bones and thn new pharynx are dealt with separately in simple form. There are further separate chapters on head injuries radiography and developmental abnormalities. Thn latter subject is the only entirely new chapter and is a welcome addition

Thn author states his aim is to explain thn effects of diseases of thn nervous system but in describing other conditions affecting the skull he produces a very differential diagnosis

Thn text is concise and clearly illustrated. There are 390 illustrations of radiographs In a book that is meant as a pictorial teaching aid it is disappointing that some of the illustrations are of poor quality. This criticism apart it will still be used to good effect by thn student of radiology and the clinician with an interest in neurology

FWP

THE CONTROL AND MANAGEMENT OF COMMUNICABLE DISEASE Ray Ashworth Pp 143 London H K Lewis & Co Ltd £5 00

This paperback handbook covers thn same subject as thn long established American Public Health Association Control of Communicable Diseases in Man. It has almost no advantages over this publication. It is physically large, more expensive, and much less comprehensive. Perhaps thn fact that it is British and therefore advice on management of cases is more pertinent to British society is its strong point. There are serious shortcomings as may be seen in the section on Malaria. Thn necessity for hospitalisation and the importance of identification of the parasite is not stressed, advice to treat malaria contracted in South America or South East Asia with oral quinine for 10 days is not thn accepted practice, nor is thn advice given on prophylaxis with chloroquine regardless of thn area to be visited.

This book is unlikely to help those responsible for public health and microbiological laboratories as one might expect for the author is the Director of the Public Health Laboratory in Chelmsford. Aspects such as immunisation schedules, school attendance and the prophylactic and therapeutic uses of human immunoglobulin are well documented in short appendices. It may have a place for the busy GP but it cannot be relied upon for anything other than a brief guidance of thn control and management of communicable diseases

PDC

MEDICAL ZOOLOGY FOR TRAVELLERS John Bull Crosby Pp 127 Chichester Harris Noble Books Ltd

This little book is thoroughly recommended to all. For the professional it contains a wealth of useful information on every type of insect, spider and snake that threatens thn health of the Traveller. For the layman it is equally fascinating and contains many gems that can be dropped casually at a cocktail party to make thn ladies attentive and the gentlemen green with envy. For example did you know that thn natives of India Burma and thn Indo Malay archipelago spit on cobras rousing them from their sleep and then kill them first? And you might like to casually comment that its taste is not dissimilar to that of roasted lizard! For the child at heart a wonderful book to stimulate the imagination. Where else could you discover that thn easiest way to catch lions is with a box of soap or that you can tell if a dog has fleas by the roughness of his coat and yet so sensitively and gradually as it is written that it would not frighten them.

For the adventurer at home to that thn travelling serviceman there are many useful hints on tropical hygiene. For example standing the legs of beds in cans of kerosene will deter all walking insects while mosquito nets will deal with those that fly or just drop in. The geographical detail makes the book of particular use as a reference to the types of dangerous animals to be found in a particular region. Ships medical officers and expedition leaders would therefore be well advised to get a copy.

Finally it just might help you to know that the Australian tiger snake is amongst the most venomous in the world and that thn Great Western diamond backed rattler thn most lethal snake in thn USA is descended from thn Asian pit vipers who originally made it to the New World across a northern land bridge with Chums. Oh yes and if you want a holiday without a poisonous snake in sight why not try Ireland or Iceland not Madagascar.

PDC

SERVICE NEWS

OBITUARIES

SURGEON REAR ADMIRAL J A MAXWELL CB CVO CBE FRCS died at the Windlesham Clinic on July 12 1980 at the age of 90

Surgeon Vice Admiral Sir Derek Steel FRCS writes

My task is to write an obituary about one of the few with whom I served for something less than two years and whose name and reputation were by then already a legend in the Service. Joe said that was the name by which we all knew him - a compliment in itself was a competent surgeon and a well qualified surgeon. He was an equally able administrator, a keen games player and a talented musician. Very few naval medical officers can have served in such a large variety of appointments as he. First with the Royal Marine Artillery, How Bty brigade in France in World War I, then in the cadet training ship *HMS Trincomalee* then as Surgical Specialist at Malta, Chatham and Plymouth with an interlude on the Royal Mail to Canada in 1939. Service in HM Hospital Ship *Oxfordshire* followed in 1943 when he was made CBE for distinguished service in dangerous waters during operations at Sicily and off the Salerno beaches. After this he was posted to RN Auxiliary Hospital Sydney in charge as the acting rank of Surgeon Rear Admiral. This was the largest hospital in the history of the Naval Medical Service. Subsequently he was in charge at RNH Haslar and then when Service retirement came he accepted in 1950 the position of Medical Superintendent of St Mary's Hospital Portsmouth a very anxious task contacting with the organisation of the NHS.

Joe Maxwell was born in May 1890 and entered Trinity College Dublin in June 1907 graduating in 1912. He entered the Royal Navy in 1914 and retired in June 1949. He gained his FRCS in 1926. Having completed his appointment at St Mary's in 1950 he went to live in Compton Chamberlayne in Wiltshire with his wife Dorothy who recently predeceased him. Admiral Maxwell's services were recognised by the award of an OBE in 1938, the CVO in June 1939, the CBE in May 1944 and the CB in January 1950. He served in the ninth of Surgeon Rear Admiral for some five years: a most exceptional record and his ability

to lead *HMS Empress of Scotland* to Liverpool in October 1944 for passage to Australia I met Admiral Maxwell for the first time and very soon became aware of his energy and drive. There were also a number of Civil Servant consultants in hand, members of his staff, Sir Gordon Taylor, Professor Lambert Rogers, Mr Kendall of Kings and several others. In addition there was most of the medical staff for the 2500 bed hospital at Herne Bay, Sydney. Many of us thought the passage would be a completely idle holiday but we quickly found that Joe had as all organised and working out the details of the impending take over from the Johns Hopkins US Hospital we were relieving. The arrival in Sydney was very exciting and we had a wonderful reception from everyone but the hospital we were to commission was in a near derelict condition. It had been evacuated by the Americans as pleased but in the main in the local Ned Kelly's had moved in and stripped the place of everything that could be carried away, much of it irreplaceable in wartime. However under Joe's great leadership and enterprise we actually succeeded in taking on first cases from the British Pacific Fleet within a few weeks. This achievement was due to his energy and ability to create a sense of urgency in his team. We begged, borrowed and bought and even won essentials from the Sydney hospitals. He also created an atmosphere within NSW hospitals which led to an integrating with them professionally in a most rewarding manner. Finally the 1750 beds were fully manned and utilised — the remaining 750 were not required because of the sudden ending of the Pacific war. Once the markers really got under way the SRA left us for UK in time, over the RN Auxiliary Hospital at Sherbarne. Apart from meeting him at the RN Medical Club dinners and parties did not cross again.

In finishing I would like to say that I and many others learnt a great deal from the high standards Joe always demanded and even more important gained. He will always be regarded by me and by many of my colleagues as one of the brightest stars in our Service. He was the type of man who is not produced in every generation and his services to the Royal Navy have been up to except one!

SURGEON CAPTAIN C KEATING CBE MSM LRCPI & LM, LRCSI & LM RN Retd, died on April 26 1980 at the age of 81

Born in Limerick on January 9 1899 Claude Keating served in the ranks of the RAMC as Staff Sergeant and Acting Sergeant Major from March 1915 to December 1919 He saw action in France and North Russia and was awarded the Meritorious Service Medal He then went on to qualify in Dublin in 1924 gaining both the Gold Medal in Operative Surgery and the Silver Medal (1st prize) in Surgery at the Royal College of Surgeons in Ireland

He entered the Royal Navy as a Surgeon Lieutenant in 1925 and served in *HMS Hood HMS Bee* (as MOIC at the ship and the Yangtze Flotilla) *HMS Tamar* and at RNH Malta His wartime appointments included *HMS Rodney* RNH Haslar and Medical Officer in Charge RNAH Bushmills He was promoted to Surgeon Captain in 1946 and was awarded the CBE in the 1948 New Years Honours Captain Keating's final appointment before retirement in 1955 was as Principal Medical Officer RN Barracks Portsmouth

SURGEON CAPTAIN E HEFFERNAN, OBE MB ChB BAO RN Retd died on April 16 1980 at the age of 90 years

Edward Heffernan qualified at University College Dublin in 1912 and entered the Royal Navy in 1914 His wartime appointments included the Armoured Car Division the minesweeper *HMS Saxon* and RNH Haslar He then spent two years attached to the RAF at Coltishall Air Station Shetland followed by service in *HMS Royal Oak Mash Adventure Norfolk* and the Hospital Ship *Assaye* The outbreak of the Second World War found him in *HMS Aquila* where he served until August 1943 being awarded the OBE in 1941 for bravery and devotion to duty in boarding a burning merchantman during an enemy air attack He was placed on the retired list in 1944 and appointed to serve as a Surgeon Commander his last appointment being in the Admiralty Medical Board

SURGEON CAPTAIN B R ALDERSON LRCP LRCS Ed, LRFPS Glas, RN Retd died on April 26 1980 at the age of 70

Following four years in the RNVR Basil Rodby Alderson entered the Royal Navy as a Surgeon Lieutenant in April 1935 His wartime appointments included *HMS Kelly HMS Southhurst* and RNH Haslar He served at RNH Malta from 1945-47 and as Senior Medical Officer to Flag Officer Malaya Area and SMO and Specialist in Radiography *HMS Terror* 1949-52 Following promotion to Surgeon Captain in 1955 he was appointed to RNH Bristol and finally to *HMS Ganges* being placed on the retired list at his own request in 1965

Off duty Enid Alderson was a keen cricketer — she played for the RN while in Singapore and was for a time a selector for the WRNS cricket team

We regret to record that **SURGEON COMMANDER (D) G C. TAYLOR LDS RCS (Edin) RN** died suddenly on July 6 1980 at the age of 49

Guy Taylor qualified in Edinburgh in 1953 and entered the Royal Navy as an Acting Surgeon Lieutenant (D) in June 1954 He transferred to the Permanent List in 1956 was promoted to Surgeon Lieutenant Commander (D) in 1961 and to Surgeon Commander (D) in 1965 In 1966 he was appointed Senior Dental Surgeon *HMS Condor* and in 1974 following service at RN Depot Deal and *HMS Ganges* he was appointed Senior Dental Surgeon to the Joint Services Families Clinic and SDS to Flag Officer Malta At the time of his death he was SDS to Flag Officer Medway

Surgeon Commander Taylor leaves a widow and two sons to whom we offer our deepest sympathy

Surgeon Commander C W Mills writes

It was my good fortune to know Guy Taylor for only two recent short periods of time During those months I formed a strong affection for Guy Taylor a family finding Guy in his exceptionally kind and thoughtful person who would go out of his way to be of any assistance On both occasions when I joined a new establishment Guy took me under his wing and guided me along the right lines both as a naval officer and as a friend

Guy Taylor loved the Royal Navy and the Royal Marines In book matters guide in Gibraltar in the Service the members of which will miss him most least myself to whom he was a friend and adviser

We have just learnt of the death of **SURGEON COMMANDER (D) P R ROGERS, LDS RCS RN Retd** in September last at the age of 60

Peter Raymond Rogers qualified at the Royal Dental Hospital in 1943 and served in the RNVR from February 1944 to June 1947 His appointments included *HMS Ganges HMS Dipper* and Royal Naval Barracks Devonport

In April 1952 he transferred to the Permanent List RN as a Surgeon Lieutenant (D) serving in *HMS Indefatigable Ocean Saltash St Vincent* and *Sea Eagle* On promotion to Surgeon Commander (D) in 1962 he was appointed to *HMS Heron* then to *HMS Drake* as Senior Dental Surgeon where apart from a short spell in *HMS Goldcrest* he served until his retirement in January 1971

As a personal recollection of the above officers would be welcomed by the Editor for publication in forthcoming issues of the Journal

RN MEDICAL AND DENTAL OFFICERS

HONOURS & AWARDS

[illegible] (Brother) of the Order of St John of Jerusalem on 21 May 1980

Surgeon Rear Admiral F J O Kelly OBE QHP

HIGHER QUALIFICATIONS

Surgeon Rear Admiral J Keeling — MFOM

Surgeon Commander R N M Gray — MFOM

Surgeon Lieutenant A P [illegible] E Meredith — DLO

Surgeon Lieutenant M C Page — MRCP

Surgeon Lieutenant S H D Shaw — DRCOG

PROMOTIONS

To Surgeon Lieutenant Commander
J E Anderson R E Ashton M J Hollis
C D Houghton T R D Riley F C Rinnehman
S H D Shaw

To Surgeon Lieutenant Commander (D)
W H F Clarke S Davies

To Surgeon Lieutenants
R G Benjafield J Berth James D C Brown
C P T Clogie G W L Evans D Harmer
K Gillespie M C Newman E H N Oakley
P I Rothieh C J Stoet D J Ward
G M F Woodroof

To Surgeon Lieutenant (D)
V Patel W T McNall

To Acting Surgeon Lieutenant
A J Ashworth G L Briars G H Evans R J N
Garth C M James C J G McArthur S H Mnrch
G M Phillips R W Smith M C J Wale

Provisional selections for promotion to date December 31 1980

To Surgeon Captain
J E Gornall W Whitrow

To Surgeon Captain (D)
D M Lindsay

To Surgeon Commander
P T Bull R T Cannier N F Lightfoot
S B Merrill

To Surgeon Commander (D)
J Hargraves

TRANSFERRED TO FULL CAREER COMMISSION

Surgeon Commanders J A Bakhet A Craig

Surgeon Lieutenant Commander G H G McMillan

TRANSFERRED TO MEDIUM CAREER COMMISSION

Surgeon Lieutenant Commander F F R Tolley

Surgeon Lieutenants C G Johnston P Litchfield
S S Ridout

TRANSFERRED TO EIGHT YEAR SHORT CAREER COMMISSION

Surgeon Lieutenant (D) W H F Clarke

NEW ENTRIES

Surgeon Lieutenants M J Fox J R C Heyworth
R W Martin

Acting Surgeon Lieutenants J F Greer R G Jones

Surgeon Sub Lieutenants A J Burgess M Caiger
A P L Goodwin A R Lillywhite A W McEwen
G A Moyse R C Scott P R Westwood R N A
Wood

RELEASED FROM SHORT CAREER COMMISSION

Surgeon Lieutenant Commanders N F Beasley
D J Robinson R J Wilson

RETIREMENTS

Surgeon Rear Admiral F.J. D'Kelly OBE QHP retired on September 24 1980 after more than 33 years service. Having joined the Royal Navy in March 1948. With his wide and varied Service experience his retirement must inevitably leave a large gap in the ranks that will difficult to fill.

In his last two appointments he grappled successively with the relatively uncharted wastes of Surgeon Rear Admiral (Ships and Establishments) at Plymouth and Surgeon Rear Admiral (Naval Hospitals) at Haslar. In was unique in filling two Surgeon Rear Admiral appointments in succession.

In his early days Frank served with the Royal Marines in the Far East in the halcyon period soon after the war. Transferring to the Permanent List in 1952 a variety of appointments including a tenure of the Flight Air Arm in *HMS Centaur*. Finally took him back to University College, Dublin, his *alma mater* to gain the DPH in 1961. In 1963 he returned to Singapore for three years as Naval Medical Officer of Health and Senior Medical Officer of the Dockyard. During this commission he was awarded the OBE in the Birthday Honours of 1965. Following further naval health appointments and promotion to Surgeon Captain in June 1971 he was made the First Deputy Director of Health and Research for the Navy in the reconstituted Medical Directorate of 1972. The prized appointment to Gibraltar as Staff Medical Officer and Medical Officer-in-Charge of the hospital there followed in 1974 and on his return he was promoted to Flag rank.

Within the Medical Branch Frank will be remembered not only for the part he played in fashioning the naval navigation of community and occupational medicine but as a wise and truthful friend

[illegible] we will [illegible] kindness and [illegible] a spell [illegible] must go to Ivory Bay, [illegible] warmth [illegible] and romps [illegible] out of [illegible] his most [illegible] residences. We wish [illegible] all success and a long and happy return at

---

Surgeon Commander (D) R.J. Biggs whose last appointment was Senior Dental Surgeon *HMS Sultan*

MEDICAL SERVICE OFFICERS

PROMOTIONS

To Lieutenant Commander
J.A. Sheridan

G.A. Storrie

To Lieutenant
F. Reed

To Acting Sub-Lieutenant
R. Farland P.P. Nobl P.A. Spreadbridge

ROYAL NAVAL RESERVE

PROMOTIONS

To Surgeon Lieutenant Commander
A.D. Macleod W.D.F. Smith C.F. Wrigley

To Surgeon Lieutenant Commander (D)
N.F. Martin

NEW ENTRIES

Surgeon Lieutenant Commander S.G. Bennett

Surgeon Lieutenant Commander (D) R.T. Walker

RETIREMENT

Surgeon Lieutenant Commander G. Rosalls

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

AWARD

On July 24 the Commandant General Royal Marines presented Senior Nursing Sister Miss M. Etherington with a citation and award for her services in Northern Ireland

PROMOTIONS

To Superintending Sister
Miss M I. Hughes Miss M A. Taylor

To Senior Nursing Sister
Miss A G. Brown Miss E A. Day Miss L. Gibbon
Miss A F. Laing

To Nursing Sister
Miss M E. Law Miss P H. MacGrath

NEW ENTRIES

Senior Nursing Sisters Miss C B. Alendorf
Miss M. Buxton Miss S. Croughan

Nursing Sisters Miss P J. Dias Miss M J. Evans Miss B M. Hales Miss H. Middleton Miss B. Williams

RETIREMENT

Superintending Sister Miss T. Doyle, ARRC

Lt Mi[illegible] C[illegible] A[illegible] V[illegible] Thorat J A B Harris r
OHP TKCR [illegible] C. B[illegible] [illegible] Human Fa[illegible]s
Research [illegible] [illegible] [illegible] [illegible] Centralh Research
Service d[illegible]

GILBERT BLANE MEDAL 1979

[illegible]

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Signature

Name in block letters

Address

Date

When completed, please forward to the Editorial Secretary, Journal of the Royal Naval Medical Service, Institute of Naval Medicine, Alverstoke, Hants PO12 2DL, for record and transmission to bank.

NOTICE

THE EDITOR invites medical and dental staff to send in original papers on professional subjects travel personal experiences and other matters Items of news and matters of interest to the naval medical service will be welcomed from ships and establishments on home and foreign stations Notices of births marriages and deaths are inserted free of charge to subscribers

Articles and communications may be sent at any time to **The Editor, Journal of the Royal Naval Medical Service, Institute of Naval Medicine, Alverstoke, Hants, PO12 2DL** Two copies should be submitted in typescript Double spacing should be used throughout References should be in the Vancouver style (J Roy Nav med Serv 1979 65 179)

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For all others not in the above categories the subscription will be £7 00 per annum (post free) $15 00 USA & Canada

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